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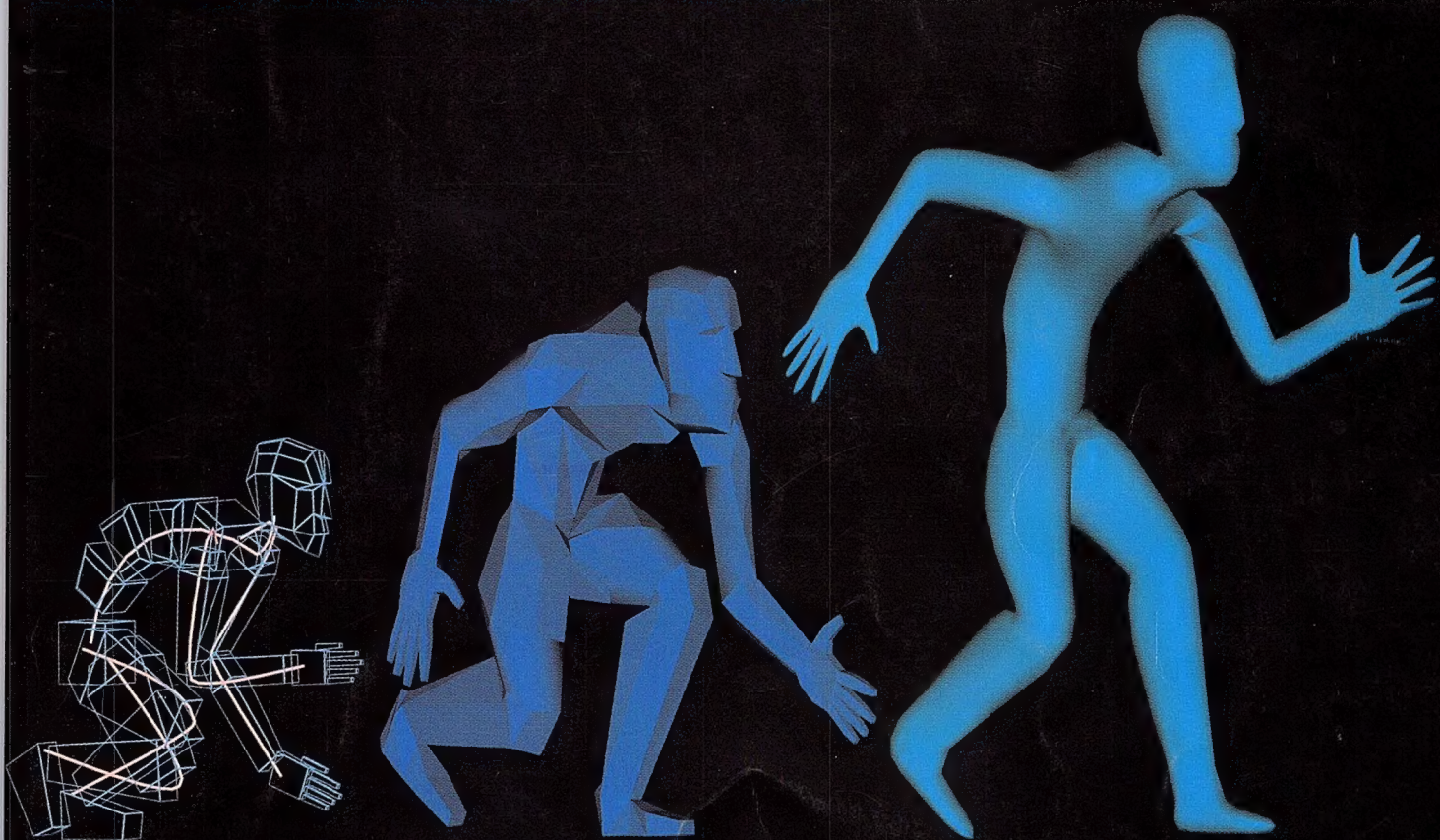
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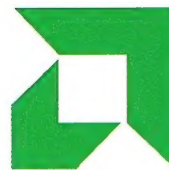


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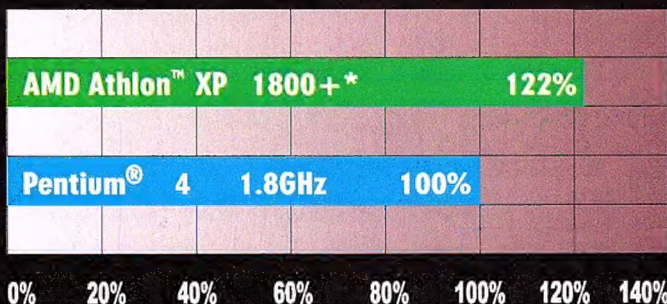
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Given the undoubtable super-duperness of modern video cards, how come our frame rates can still suck? There is a good reason for this, so we decide to let you in on the terrible secrets of fillrate theft.

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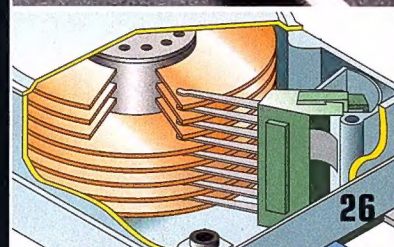
Why buy a UPS when you can make a far cheaper UPS from common household items? Only cowards fear electrocution.

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What do you get when you team up Atomic with a bunch of graduating IT students? The best darn Shockwave competition ever, that's what.



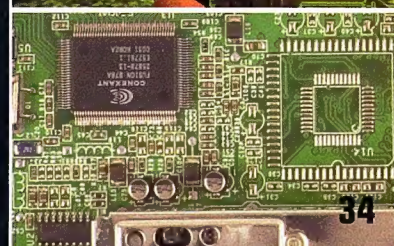
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Technophobephilia

It wasn't that long ago when it was conceivable for one person to know everything. Any competent person could fix any broken machine, and explain how it worked. Nearly all science was comprehensible. Things were made of wood or steel, were held together with bolts, and when something new came along, like quadraphonic sound or an 8-track, it was a big deal and was significant for years.

Now we live in a new and radically different age. There is so much stuff to know, so many daily technical breakthroughs, that one is forced to 'specialise' to have a fighting chance. It's sort of sad knowing you can't know it all; that cool stuff is passing you by without you even aware of its existence.

We've all specialised. We've chosen PCs and we tool around with them because it feeds our insatiable appetite for knowing about stuff. Computers are good for that. Whether you make a living from them, or just like to tool around, computers demand constant attention and up-to-date expertise to keep them happy, which in turn, keeps you happy.

But that's just the kind of people we are. Some would call us 'Atomicans', the official Macworrry Dickshinary term for the love of machines; the street term, however, is 'technophile'. I'm guessing that all Atomic readers are technophiles. That's a good thing, shout it loud and proud, then come back and keep reading.

That felt good, eh? Now, all things being equal and opposite, there's another species out there. Known as 'technophobes' these poor souls feel intimidated by machines. Their VCR clock is still flashing '12:00' and they only use their iMac for email. Poor bastards. While we should pity, nay, despise these mutant freaks, it is our duty to edumacate them. We understand that when bad stuff happens it's the machine's fault, not ours. They don't see it that way; they feel they are somehow incapable of dealing with anything that comprises at least one moving part. This lack of confidence leads them to miss out on the joys of CAS latency or thermal paste conductivity.

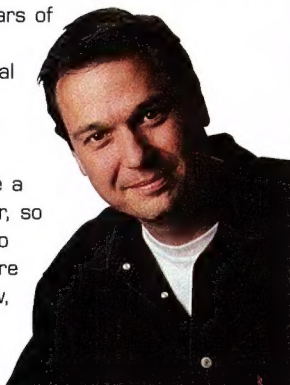
If your schoolteacher was a technophobe, it's likely that you will be too, so hang with us and learn to love the machine. We've probably all heard tales about smart kids who know more than their teacher. It's not the teacher's fault, they're trying, and the smart kid should really be helping out, not trying to be a smarty.

So should we all, however reluctantly. We just need to show them that complicated, illogically designed and over-featured machines that won't improve their quality of life in any useful way can actually be fun.

Start now. If the old lady ahead of you is hesitant to walk through the train station ticket machine because she's afraid the gate is going to bite her legs, shove her through. She'll thank you. If your dad hasn't bought a PC yet because you've spent the last decade actively discouraging him, knowing that the day he gets one will be the day your daily tech support calls begin - relent. He won't love you for it, he'll see it as an opportunity for you to repay the years of upbringing and orthodontist's fees.

But never mind. We live in a technological age and we're the kings of the world. Graciousness is up there with exploiting the peasants if you're a king, so combine the two, somehow. Help a technophobe become a technophile. And make them pay you in beer, so when the tech support calls come you're too pissed to help them, and they'll have to figure it out themselves, which will help them grow, and you'll be a good person.

Ben Mansill, Editor



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Atomic welcomes all information on new and upgraded products and services for possible editorial coverage. However, we respectfully point out that the magazine is not obliged to either review or return unsolicited products. The editor welcomes ideas for articles, preferably sent in outline form, with details of author's background and samples of previously published work. We cannot accept responsibility for unsolicited copy and stress that it may take time for a reply to be sent out.

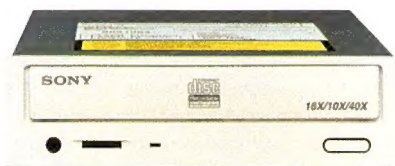


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Short Circuits

In the latest Atomic WorldLAN GibFragCON 97: XP news, we are proud to announce that the crew from Shafted (www.shafted.com.au) will be on hand to help run the gaming portion of the LAN. While MAD_MAN_MODZ and the rest of the crew are helping to make this the most fun LAN event in history, the years of expertise that are behind Shafted will mean that all the networking and gaming will have the reliability and efficiency for which they are famous. For all the latest details on the event, head over to www.atomicmpc.com.au.

irc.colorado.edu, the Net's oldest 'continuously operating' Internet Relay Chat (IRC) server, has de-linked from the EFNet chat network.

Colorado's IRCD process was killed by the server admins due to the massive costs involved in maintaining what was, essentially, one huge Denial of Service target. Colorado's IRC server had been in operation since 1998 and will be sorely missed on the EFNet network.

Acer Communications and Multimedia (AcerCM), a division of Acer that manufactures products such as DV cameras, LCD screens, CD drives of all flavours and a ton of other assorted consumer peripherals, has changed its name to BenQ.

The move is aimed to give the company 'a new name for a new world'. At least, that's the sole reason supplied on BenQ's Web site. As far as Atomic is concerned, this is perhaps the most perplexing (and downright strange) change in brand naming since a bunch of Australian Apple stores attempted to merge together under the moniker of 'Buzzle'. Hmmm...

Really Your Honour, we can't help it

Napster has been dragged back to a US courtroom again, this time to do battle with its long time nemesis, the Recording Industry Association of America. The first round or three was over the legalities of file swapping. Now, the legal tussle revolves around who is obliged to do what to comply with previous rulings on the Napster service.

Napster declared that it requires exact file names to filter copyrighted content from its servers. The RIAA, however, sees fit only to produce lists that contain song names and artists. The problem is obvious: just because the RIAA has listed 'KoRn; No where to hide' as a song that may not appear on the Napster, it will not stop users renaming the

song to something along the lines of 'KOr\|; NO wh3r3 tO h|d3', thus bypassing any potential filters put in place to stop trade in copyrighted content.

While the eventual outcome of the Napster saga may serve as a (US) landmark ruling on Internet file sharing, the majority of Napster users have now jumped ship to other, more prolific file sharing apps based around Peer 2 Peer (P2P) technology. Unfortunately, for these file sharing 'information has to be free' zealots, these types of programs are the next logical progression for the RIAA and its compatriot, the Motion Picture Association of America (MPAA), as they continue to wage war upon Netizens around the world. O

Patently ridiculous

OK, the title may not be overwhelmingly original. However, the same may be said for a patent recently granted to American company SonicBlue concerning Digital Video Recording, or DVR. Filed as patent number 6,324,338 with the US Patent and Trademark Office (www.uspto.gov/patft), the patent broadly covers: 'A video data recordable having integrated channel guides allowing a user to control recording and storage of television signals into personal channels for later playback and viewing. In the described embodiment, the user may specify criteria for recording of shows from an input source such as a broadcast signal and shows are then selected based on the user specified criteria and recorded for later playback.' As

Atomic understands it, the patent recognises SonicBlue as the inventor of DVR technology while also granting ownership rights to SonicBlue. This development will mean that future DVR products from competitors such as Microsoft or TiVo may have to pay SonicBlue royalties for use of patented DVR techniques. O

Smaller and smaller

The concept of Fab-less companies has hit a major stumbling block over the past few months. In the direct aftermath of Taiwan Semiconductor Manufacturing Company (TSMC) announcing that it now has a 60% global market share, whispers started to emerge that there simply was no room left on the high end 0.13 and 0.15 micron production lines.

This seemed to be confirmed by the announcement that NVIDIA had employed TSMC's main competitor, United Microelectronics Corporation (UMC), to produce between

5,000 and 10,000 XGPUs per month, the video hardware that powers the Xbox. The situation then became even more muddled when both TSMC and UMC asked companies to start pre-ordering 0.18, 0.15 and 0.13 micron fab time for the first quarter of 2002.

This year has already been marred by chip shortages, especially after the initial release of the GeForce3. As the chips that power high-end graphics hardware become even more complex, and speed requirements necessitate finer manufacturing processes, the overcrowding of the production lines will only get worse.

There are a few possible solutions. The first is something that TSMC has been looking at, and that is following the flood of Taiwanese manufacturing plants into the Shanghai region of China. This is still doubtful, as TSMC believe that the region still lacks workers skilled enough to cope with IC production, something that should improve in time. The other idea is that NVIDIA is in the market for a fab of its own (there is a card manufacturing plant in Juarez, Mexico that it could try to retool). Either way, something has to give or we will be stuck with graphics card shortages for a while to come yet. O

British is back

After parting company with Electronic Arts over a year ago, Richard Garriott, the legendary creator of Ultima Online retired to the recesses of his moated castle in Austin, Texas. Now he's re-emerged to reprise his Ultima role of 'Lord British'. But this time he takes the throne in Lineage: The Blood Pledge and he's gotten the game's creators, NC Soft, to swear fealty to him.

Atomic: What's wrong with current MMORPG?

Garriott: In EverQuest, you usually start out so wimpy. You don't feel very heroic killing rabbits and toads until you're strong enough to tackle monsters. Lineage has play and interface similar to Diablo, so you can wade through goblins and orcs, even as a beginner. Kill them. Get lots of treasure. Feel accomplished right away.

In EverQuest, what you do in months two, three, four and five is level up. Level up. Level up. Then level up some more. So you're very devoted to simple mechanical levelling. Very addictive. A good, slot machine mentality.

Atomic: EverCrack. But something's gotta keep players hooked, right?

Garriott: Right. But the motivating reason is not fictionally based. Lineage solves that. You swear fealty to another prince or princess in the game, go and raid castles and kick out the owners. You now own it and can set the tax rate in the region. With that tax you hire allies to defend you. Now you're the epitome of all the other players who would like to overthrow you. It's a great elder game.

Atomic: How's the episodic structure going to help Lineage's appeal?

Garriott: Each new episode has a whole suite of territory, monsters and equipment, and a little story evolution. We do that every quarter. If you dribble the stuff out, like with EQ and Ultima, the bang is gone pretty quickly. If you release it at once, it becomes a happening with everyone simultaneously experiencing it.

Atomic: You're no longer with EA, who own your baby, Ultima. Any bitterness?

Garriott: EA has totally bungled its online strategy. UO was the fastest selling game in EA's history. But they say to me, 'We think it's a fluke.' So they spend \$US200 million on Sun servers and Oracle Databases and buy AOL's games channel for \$US80 million. Then they say, 'Richard, instead of doing a new, big online game, we'd like you to do Java Applet games like chess and checkers.' My highly paid team couldn't even put a business proposal together for the \$US200,000 or so EA wanted to pay for these things. That led to my departure.

Atomic: And then?

Garriott: I retired from Origin about a year and a half ago. That day I got drunk with a bunch

of my buddies and registered the Destination Games Web site as our new company name. It was 1 April when my non-compete clause with EA ran out so I couldn't do much. On 10 April, EA had its big lay-off, including many Origin people. We immediately hired them all. **Atomic:** So they are people who have worked with you previously?

Garriott: For the last 20 years. Here's what's really ironic – we started Origin in 1982 with \$US70,000 in personal capital. Never borrowed a penny. Eventually sold it to EA for tens of millions of dollars

Atomic: The exact figure?

Garriott: About \$US30 million. Then EA give us back the company for free. Now we merged into NC Soft.

Atomic: Guess you're pretty confident about the future of Lineage.

Garriott: We can't not do well with this game, this team. □



① A shot of Lineage doing its thang.



① Richard Garriot – a man's man.

Short Circuits

▲ Compaq has voluntarily recalled around 5,000 internal 56k modems that shipped with its Presario Desktop 5300 and 5600 series systems. The modems were recalled due to lack of compliance with Australian Communications Authority (ACA) standards. This apparently occurred after a certain unnamed person at the manufacturer decided to make changes to schematics between the modem design and production phases. Oops. Customers may contact Compaq on 1300 368 369 to find out if their modem is affected. If so, the modem will be replaced free of cost.

▲ The Institute of Electrical and Electronic Engineers (IEEE) recently approved a new wireless standard, 802.16, described as an 'Air Interface for Fixed Broadband Wireless Access Systems'. The new standard, developed over a two-year period, should help create a base for widespread implementation of high-speed wireless Medium Area Networks. This should be especially useful when dealing with the 'last mile' problem inherent to broadband Internet.

▲ Scientists at the University of Münster in Germany have successfully regrown severed optical nerves in mammals. Experimentation carried out on rats showed it's possible to regrow a severed optic nerve by up to 14mm.

It is thought that the release of a protein called 'crystallin', found within the eye lens, restricts the effectiveness of other growth inhibiting proteins present. The discovery is a major breakthrough for neuroscience, though it also has potential applications in the treatment of spinal injuries. Let us hope.

Short Circuits

Although fans of Japanese Role Playing Games for the Dreamcast (yes, we're referring to the both of you) didn't know they were in for an extra special 'treat' with the Japanese release of Kool Kizz's *Atelier Marie* RPG. Not only did Kool Kizz give its fans a shiny new game to play with, it also included a few extra 'features', such as screen savers for use on the PC. Unfortunately for all involved, one such extra was slightly more malicious than your average Flying Windows eye candy. The W32/Kriz virus had made its way onto the *Atelier Marie* CD, which made for a nasty surprise come 25 December when Kriz is due to activate and erase your CMOS, overwrite your BIOS and kill your disk sectors. However, the situation isn't all bad. Whomever Kriz's author was, he or she had a sense of humour; included in the Kriz binary (though not displayed or actively used by Kriz at any point) is a poem that contains a large amount of invective. Perhaps intended as a suggestion on how to describe your post-Kriz Christmas?

The Xbox is still a few months away from our shores, but the conspiracy theories have started. One rumour that has come to the attention of our Atomic Spy Ring is that the Xbox is something more than just a games console. While confused by rumours of a console/set top box successor to the Xbox, called the Homestation, the Xbox itself may quite easily evolve into a set top box. The combination of USB derived controllers as well as the hard drive and broadband adapter means that a lot of the necessary elements are there. It wouldn't take a huge leap in logic to see this happen.

Double Double Data Rate

PC133, PC600, PC800, PC1600, PC2100, PC2700, SDRAM, DDR, RDRAM, DDR266, DDR333. Had enough of confusing RAM acronyms? Well, you ain't seen nothing yet. Memory manufacturer Kentron has announced that it has DDR based QBM (Quad Band Memory) technology ready to hit the market later this year. QBM is a way of doubling the bandwidth of DDR RAM by using custom control chips mounted onto a 184-pin DDR style DIMM. These chips regulate the flow of data onto DDR modules and employ some fancy tricks to double the effective output a second time. While DDR uses the rise and fall of clock signals to achieve an effective double throughput, QBM controls the modules in pairs, offsetting the signals and achieving an effective quadrupling of data throughput.

Heavy stuff, but in real-world terms what can we really expect? The goal is to provide DDR DIMMs that squeeze an effective 533MHz output over a 133MHz data bus. This number is significant, especially given that it should hit the street at the same time that

the next iteration of RDRAM, which employs a different method to squeeze the effective 533MHz out of a 133MHz.

Early estimates are that the changes needed to create QBM DIMMs are minimal, and should only add \$US10 to the cost of existing PC2100 DDR modules. According to Kentron, the modules are also designed to exist within the current DDR standards; this combines with the fact that the control chips sit on the DIMM rather than the motherboard to deliver a solution that requires minimal changes to current chipsets.



A stick of QBM RAM.

Ahhh, the memories

All your Usenet belong to us! Well, Google actually. And they don't really belong to Google, per se. Google, everyone's favourite search engine, has done what many thought to be impossible – collected a complete archive of all Usenet posts from the last 20 years. That's around 700 million posts in over 35,000 topic areas! But wait, there's more. Not only has Google collected 20 years of valuable Internet history for preservation and public display, it's also attempting to extract posts that deserve special attention as real gems. Posts such as Linus Torvalds' first Linux announcement, the first post from an AOL account, the first mention of Microsoft, the first post from Germany on the fall of the Berlin Wall, and a post from Tim Burners-Lee regarding the 'World Wide Web project'. If you

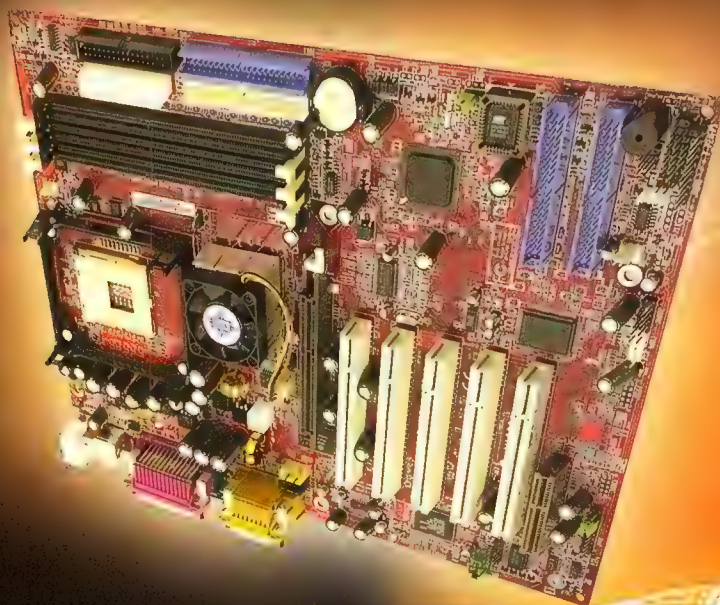
want to avail yourself of the Google Usenet archives (and let's face it, who wouldn't), surf on over to www.groups.google.com. However, we have one word of warning. Google's archive has the uncanny ability of making you feel old, especially when you come across a post you dimly recall writing way back in the mid '80s. Ah, nostalgia.

What's HOT

- **Bandwidth**
The key to better 3D gaming
- **GTA3**
One day it may return
- **Ghetto Scooter**
www.ghettoscooter.com. It rocks
- **Underclocking**
Beat the summer heat
- **2002**
The future. Cool

What's NOT

- **Fillrate**
Our one time friend, now pure marketing speak
- **GT3**
Why buy cars when you can steal them
- **Segway**
Sucking the fun out of death defying
- **Overclocking**
So hot it's not
- **2001**
Space Odyssey my arse



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845 Ultra-A

- support DDRAM
- support P4 socket 478 CPU
- Intel 845D chipset
- promise ATA133 (optional)
- promise Raid (optional)
- USB 2.0 (optional)

K7N420 Pro

- support DDRAM
- support AMD AthlonXP
- support upto 3Gb RAM
- Nvidia Crash12+MCP-D
- onboard VGA and sound
- Dolby-digital SPDIF out
- TV-Out (optional)



645 Ultra

- support 333Mhz DDRAM
- support P4 socket 478 CPU
- SIS 645 chipset
- onboard sound
- 645 Ultra (MS-6547v1)



K7T266 Pro2-RU

- support DDRAM
- support AMD AthlonXP
- KT266A chipset
- Raid (optional)
- USB 2.0 (optional)



MSI™

Link to the Future

Memories are made of this

Ashton Mills isn't afraid of the future, he just hopes it's like the good old days.



'We are lucky to have lived through and seen the growth of what is now an industry more profitable than Hollywood. Games are where it's at. But exactly ten years after the PC gaming industry revolution'

There's something to be said for the games that defined the industry as we know it today. It was only ten years ago that PC gaming really started to take off – an era of gaming when genres weren't copied, they were made on the spot.

In 1992, two new genres were created that shaped and to this day still dominate the gaming industry: the first person shooter that Wolfenstein from 3dRealms embodied and the first real-time strategy that Westwood's Dune II captured. In this same glorious year, Wizardry 7 hit the scene and lifted the role-playing genre to a new standard that some would say still hasn't been met to this day (except, perhaps, by the recently released Wizardry 8).

Before even these greats, however, the future gaming legends of the industry released classics like the platform scrolling Cosmo's Cosmic Adventures (I loved this game – if you make fun of this, I'll kill you), along with Commander Keen and, of course, Duke Nukem, which would later go on to claim FPS glory in Duke Nukem 3D (let's hope we're not waiting forever for its sequel).

And who could forget the father of all strategy gaming, the one that sparked Master of Orion, Stars! and many, many more. yep, Reach For The Stars by Australia's own SSG.

I lovingly remember the many days, weeks and months spent playing the originals and sequels of Jagged Alliance, X-COM, Star Control, System Shock, Fallout, Wizardry and C&C, to name just a few of the classics. Many of these were firsts in the industry, and many of them hold honorary positions in the Atomic Gaming Hall Of Fame.

We are lucky to have lived through and seen the growth of what is now an industry more profitable than Hollywood. Games are where it's at. But exactly ten years after the PC gaming industry revolution, how are we doing?

Not so good it would seem. Despite the fact that the industry is a big money spinner, the production of games is a fine art and some of the most famous names in the industry are fading into the history books. Sir-Tech has officially resigned from the game, Looking Glass waved goodbye last year, Origin has been dead for a while now, andSSI gave its last breath two years ago. How can this be? It's a thin line to walk between successful titles, unsuccessful titles and the simple passage of time. Games today are a high-risk business that take immense resources to create, without guaranteed pay-offs.

But before the PC, many were weaned on simple eight-bit gaming machines such as the Commodore 64. Everyone

remembers legendary games such as Bards Tale III, Moebius, Mission Impossible, Mars Saga (one of Westwood's first games), and the all time, very enduring and still king Elite. Then there's the small, black, bundle of joy that was the Spectrum 48k, the likely cause of why I became a geek. Any game by Ultimate was a classic (these boys can still be found in the business today under the name of Rage, making games for consoles such as the PS2).

So despite the slow fall of some major PC gaming companies, it's with a smile that I discover a company called Fathammer that is restoring the fine art of programming games using machines of limited resource like the humble consoles of old. Fathammer has created a cross-platform, high speed, 3D engine for portable devices such as organisers and mobile phones. It's managed to succeed at this task by programming in assembly and pulling every trick in the book to optimise the engine for the hardware. These guys are bringing arcade gaming to a PDA near you.

Fathammer isn't new to the game, either. It was in that significant year of 1992 that a group known as Future Crew released the popular Unreal demo, followed up in 1993 by Panic! Some of the chaps would later go on to form Remedy Entertainment (Max Payne) and MadOnion.com (3DMark) before embarking on their portable gaming dreams with Fathammer. So, as you can imagine, these lads know what they're doing! I only wish they had worked on Windows.

And so it seems we've come full circle. From the smallest of machines to the beasts of today and back again, gaming has been there and done that. It was then, as now, the real motivator for pushing the limits of technology and the art of master programming. Here's hoping a new era of gaming is just around the corner.



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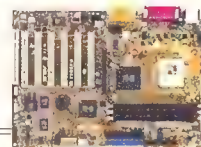
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P4S333 Specification

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The 'killer' app

'I'm sorry, Dave. I'm afraid I can't do that.' Yeah, right – I wish.



Dying is a funny thing. Usually it's bad. In fact, unless you are Tibetan, our fairly unliberated society, mortally-speaking, will have instilled in you some kind of paralytic response to the idea of merging with the infinite. That's what's so funny. Because some nights, I might die 50 or 60 times. And that's when I'm having a good night.

I remember there was this one time when I died, and I leapt up with joy, knocking my chair over, pointing in front of me, and shouting wOOT. Geez, that's the stuff. Takes me back.

I mean, there were other times when dying was a real pissar. It would be monotonous, boring, frustrating, a hindrance to making any real progress in the night. Falling off the same ledge, like, 20 times in a row, just so you can push the button in the ancient Aztec tomb – it sucks.

And THEN there's computer games.

Talking about computer games, I was thinking recently about the best gaming experiences I have ever had, and interestingly enough, they have often correlated with the number of deaths I have had.

Think about Half-Life. Remember the marines? You would enter the room, hear a couple of radio commands, see movement out of the corner of your eye, and you'd be under fire. When this happened to me the first time, I thought, no biggie, it's just a matter of the usual tactics. Walk into the middle of the room, open fire, circle strafe, do a jig, drop a couple of grens, and duck around the corner. I executed said tactics, nailed a couple of marines, pulled off a bit of a Michael Flatley (easy, tiger), and popped behind an obligatory crate, smiling smugly to myself.

Imagine my surprise then, when, for the love of God, a grenade promptly bounced around the corner, and came to rest next to my left big toe – which was promptly blown across the room. It was about then that my chair was knocked over, and a resounding 'wOOT' woke the neighbours' dog. Fully.

The other excellent dying experiences were, interestingly enough, the most frustrating, and found in the same game – Counter-Strike. There'd be times when you'd be sneaking around a corner, you'd hear steps, get tense, pop a flashbang, duck jump out, spot the terrorist (or counter-terrorist), open fire, take some hits, run out of ammo, pull out your USP (or Glock), have a couple of shots... only to be dropped at the last minute, while you watch the in-game avatar seem to visibly slump from exhaustion on 3 health. wOOTs would ensue. Thoroughly enjoyable way to depart the mortal realm.

On the other hand, there'd be times when you would jump around the corner with wild abandon, see an enemy down the corridor in the distance, contemptuously ignore them while you oriented yourself with the wall to show off the killer colour spray that you just created, and – BANG – you're dead. Hmmm. BS AK HS FFS.

Now that's frustrating.

Which brings me to the rambling point of this column. A


game can look fantastic, be revolutionary technologically, have a great premise and be set in your favourite George Lucas-based universe, but if it doesn't have that nigh-intangible schwing, then it can never hope to cut the proverbial mustard.

For me, a couple of years ago, it was AI. The marines in Half-Life opened up a gaming experience I never thought possible. Then it was Counter-Strike, which epitomised multiplayer gaming, where your opponents could be as cunning, or as plainly idiotic, as the people you meet in everyday life.

The bummer of this progression was that just at the point where AI was taking off, and everyone was praising Half-Life for introducing an entirely new element to first person shooters, online multiplayer was also taking off. While Half-Life's AI was superb for its time, and is still superb today, it cannot compare with a human opponent. On the other hand, no AI in the world is ever going to be bloody stupid enough to flashbang its own team as they run out of the spawn, or get more friendly fire kills than enemy kills – then snicker about it and call everyone gay. Pros and cons.

What disappoints me is that AI, in many ways, was left by the wayside for a couple of years, while multiplayer was the rage. Just look at games like Quake III or Unreal Tournament – their AI was advanced, but it was geared around emulating another online player, and not a real 'enemy' – and the two can often be quite different in behaviour.

Games like Ghost Recon do a lot to redress this balance, with excellent enemy AI, and also awesome multiplayer, but when Half-Life came out, I was expecting that by now I would be playing single player FPSs that had an enemy with complex behaviour patterns, and who worked effectively in teams, and be not simply made to take more bullets in order for them to be harder to kill. *cough* Return to Castle Wolfenstein *cough*.

I really look forward to the day when I can fire up a game, and really feel like I am immersed in a world with allies and enemies that behave in realistic ways – a world devoid of idiots, but not of realistic idiocy. And I'm still waiting for a fully-developed Irish jig simulator too, but that's another story. 



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Tech s'port

A glimpse into Daniel Rutter's inbox reveals acts of human kindness, and not.



'Don't worry if all you speak is something loosely describable as English, though. You still have a chance.'

I know what you all think. You think that playing with techno toys for a living sounds like a pretty good gig.

You're wrong. It's hell. Why, just this afternoon, the bunnies that brought me my free Xbox made me breakfast – and burned the toast.

But seriously, folks. Generally pleasant though my job is, I still have my own special moments of irritation, un-shared with other computer users.

I get a lot of email, for instance. Much of it's asking me questions. Sometimes I know the answer. When I have a moment, I reply. Not counting spam complaints, I send at least a dozen replies a day. I can't reply to everybody, though. If a hundred bucks fell from the sky every time I did, then I would. But it doesn't. So I don't.

To simplify things for all concerned, here are some tips on the sort of message you should send me if you want to lighten my load by making sure that I don't even *consider* replying to your assuredly legitimate enquiry.

If you know a language other than English, use it. I love the German guys who decide that since they can read English, I must obviously be a spelling bee champion auf Deutsch.

It's fun to feed such messages to babelfish.altavista.com and get 'Rear One, I have nen Duron 850, which I want over clocks. A problem, you, I do not say have however a ECS K7SA with which I the Multiplicator nich in the Bios adjusting can!!!'. But that doesn't mean that this particular Rear One is going to bother hitting control-R.

Don't worry if all you speak is something loosely describable as English, though. You still have a chance.

There's a special place in my heart – well, in one of my organs – for people who read some piece I've written that explains that the YumCha Technology Orchidtron 4300 and the Golden Umlaut SuperZoot are both good video cards, but which one you choose should depend on what you're doing, and then email me to ask 'so which one's better?'

Maybe they're just teasing me with a techno-modified Zen koan of sorts. But replying "A tree in a golden forest" doesn't seem to help.

If you ask me nine questions in one email, then even if I know the answer to all of them, I'm still probably not going to reply. This is because I don't have time to write Dan's Epistle To The Corinthians Who Want To Know Some Stuff About Overclocking.

I will be particularly unlikely to reply if Google's 'I'm Feeling

Lucky' button can answer all of your questions as well as I can.

Splitting your nine-question email into nine one-question emails, by the way, may work. But at around question four, I'm going to start liking you less and less, unless at least some token PayPal remuneration starts coming my way. God bless you.

Full points to the occasional person who emails me for help with their gimcrack Web site – as if dansdata.com looks like an HTML masterpiece, or something – and then gets really angry when I point out that doing stuff like putting 1.2 megabyte JPEGs on your page scaled down with `width="240" height="160"` isn't the greatest strategy.

Only about one out of five site-help-seekers will fly off the handle when told that their kung-fu would appear not to be the best. But that one can really turn you off replying to the other four.

I gave one woman who asked such a question a free image scaling tutorial, once. Complete with attached example files, hints on intensity curve adjustment, and links to a couple of cheap-to-free image editing packages she might like to try. She then told me to get lost, and how dare I tell her how to do her business, and who asked for my opinion anyway? I am not making this up.

A Special Achievement Award to people who ask me an interesting question, which I spend some time answering, only to discover that my questioner's reply address is nonexistent. A gold star on that Award for every time the questioner mails me again asking why I, like everyone else in the world, never seem to reply to their mail.

Some people, of course, don't get a reply simply because I don't have an answer for them. I send a fair few 'Nope - not a clue!' messages, but generally only to the people whose suffering I find amusing.

If you paid \$7,500 for a Compaq and now the thing doesn't even work then, well, you're a figure of fun. Live with it.

I'm sorry, but you'll have to excuse me now. Maxtor has a hard drive for me to review, but they've hidden it somewhere in the Presidential Suite of the Sheraton on the Park, and I may have to work my way through crates of Pol Roger before I find it. □

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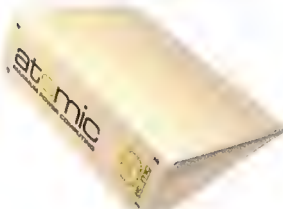
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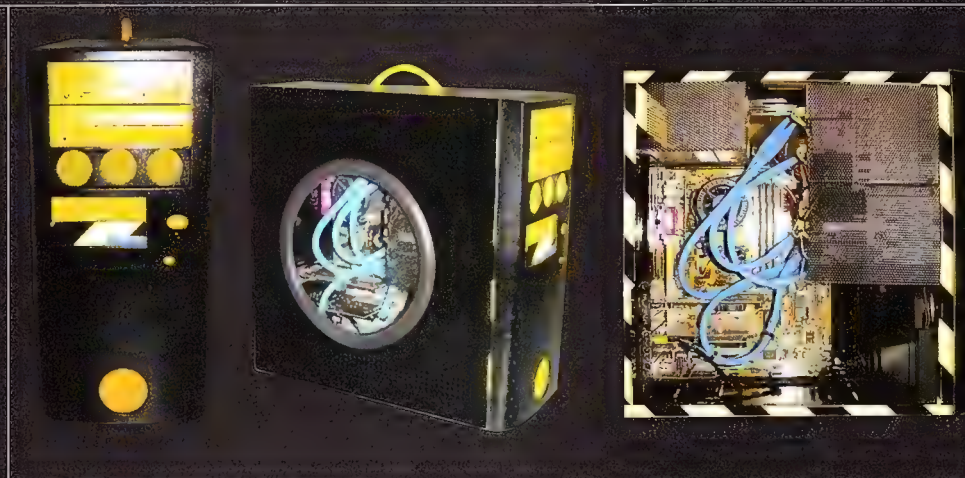
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Bradley's Gaming Beast



Technical details

- 1.4GHz Athlon CPU
- 384MB PC133 SDRAM
- 15GB and 40GB Quantum HDDs
- Sound Blaster Live! Value
- 64MB GeForce2 MX-400
- 16x Pioneer DVD
- Lite-On 3x12x8 CD-RW
- Two additional USB ports
- 10/100 Belkin NIC
- Rounded IDE cables
- Bad arse danger paint
- Amusing yellow vents
- Oceanliner porthole
- Industrial mesh

The story

After reading Atomic magazine, no longer was I content with the beige box of mystery. I wanted something more – something with style and a personality of its own. Thus the Gaming Beast was born. First of all, it needed to be spray-painted black.

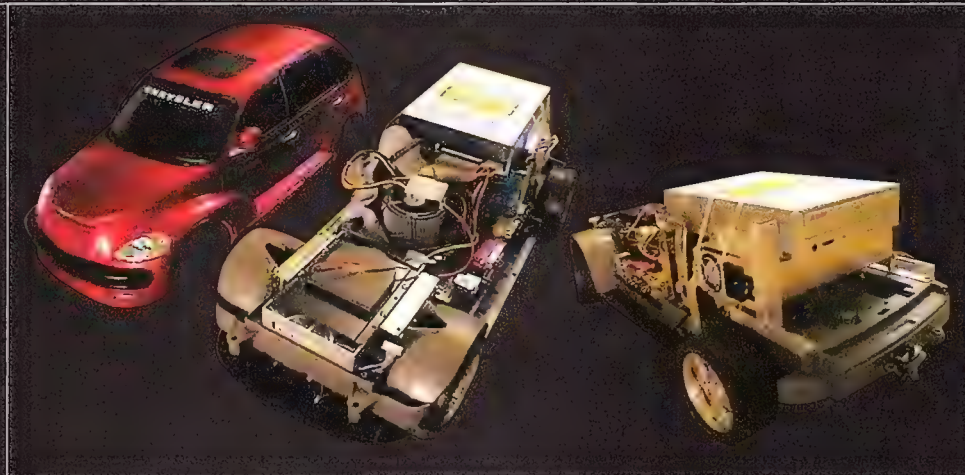
Next, I drilled a 25cm circle out of the side of my case and a perspex porthole was fitted along with a colour coded carrying handle. Several sized ports were cut in the front fascia; these were

then fitted with painted mesh grills and a rather hefty case fan. The buttons and device facias were painted to match, and reflective hazard tape was added to complete the case mod.

I added some mesh to the inside of the case to hide some unsightly wires and cables.

A blue light inside completes the monster. I'm especially proud of the paintjob. I always get compliments from jealous mates when I take my baby LANing.

RDMustang's PC Cruiser



Technical details

- 1/6 Scale Size PT Cruiser
- AMD Athlon 1GHz CPU
- 512MB PC133 SDRAM
- GeForce2 64MB
- Sony 12x8x32x CD-RW
- 20GB 7200rpm Maxtor HDD
- 16-bit Audio
- 10/100 Ethernet
- Logitech Wireless mouse
- Logitech Wireless keyboard
- Windows XP
- R/C car still operates
- Rack mount 1U PSU
- Flashing headlights

The story

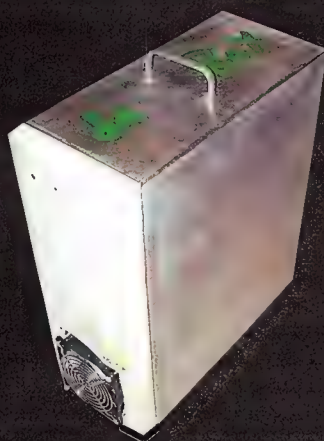
I built the PC Cruiser because I wanted a small enough computer that is easily transportable yet powerful enough to play the latest games. I am an R/C car fan and found a shell that was large enough to accommodate an entire PC while still able to use regular PC parts. Putting it together took about two months of work.

We drilled holes in the chassis for the motherboard, but then had to cut away most of the insides of the car to get the processor and

add-on cards to fit properly. We had to use a rack-mountable 1U power supply to get the CD-RW to fit. After everything was in place we simply mounted a power button and installed Windows XP, and now she runs great! It's not only a 1GHz Athlon computer, it's still fully functional as an R/C car.

The inspiration for this mod appeared in your issue last month, the Aussie GTI case mod. Due to the wonders of the Internet, I was able to check out this Aussie case mod from my home in Canada.

Tux's Da Box



Technical details

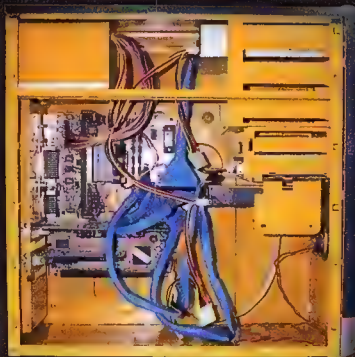
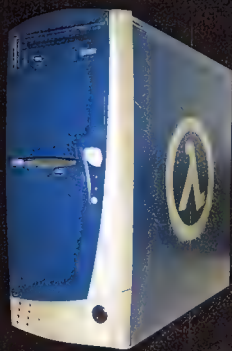
- 1.2GHz Tbird at 1.42GHz
- 384MB PC133 RAM
- GeForce2 MX400
- 30GB Samsung HDD
- 12x Samsung DVD
- Zalman copper CPU cooler
- Six fans
- Two 15in screens
- 'Raw Metal' finish
- Atomic 'go fast' sticker
- Case handle
- Iwill kd266 motherboard
- External Zip 100 drive
- Ghetto rounded cables

The story

Da Box is the result of wanting to look cool at LANs; and, with little cash a week before the big LAN a few months back (at which most people have sad cases), I got to work on the idea that I could do an article for my Web site (www.myrig.com) on how I built a cool case. So I got out the sandpaper and spent an hour or three sanding down the case from a white to the silver of the raw metal. Then I put a big 120mm fan on the front, a case handle on the top and some fans on

the side. This went down a hit at the big LAN; sitting next to all the generic unmodded cases Da Box stood out. It wasn't long before it overheated though, so after the LAN I set about remodding it. I got out my jigsaw and cut out room for a window, then put some plexiglass on that and some rubber around the edges. It has taken a beating since then with some red paint on it, and I have cleaned up parts of the rubber molding around the window. One thing to remember about Da Box is, it is ever changing.

LoRd_DeIMoS' Lordworthy



Technical details

- Pentium III 500MHz
- MSI PDS motherboard
- 512MB SDRAM
- LeadTek Winfast GeForce2 MX400 64MB
- 6GB + 40GB HDDs
- 8x DVD-ROM
- Perspex window
- Rounded IDE cables
- Dual neons
- 1337 Half-Life logo
- Interior paint job
- Back panel paint job
- No extra fans

The story

I saw all these mods in Atomic and decided I wanted one. I got a new case from a computer store, but when I got home and opened the new box I found it was the wrong one. Nevermind, though, this one looked better and had a 300W PSU.

I painted the exterior first, which took me a day but was fun nevertheless. Next, I cut the hole in the side with a jigsaw and put in the window kit I got from PC Case Gear. After that I put in dual blue

neons and blue rounded ide cables.

Then one afternoon I got bored and ripped everything out and painted the interior golden yellow, which I think gave it a good finishing touch. Now I just need some fans put in :-).

OK, so she ain't the fastest computer in town, but the case still looks good! Mostly, I use it for my ongoing attempts to win POTM on Atomicmpc.com.au, or talking trash with the kind, polite and always helpful friends I have made at #atomicmpc IRC.

how would you like your system built?

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AcerCM 15" Digital Monitor
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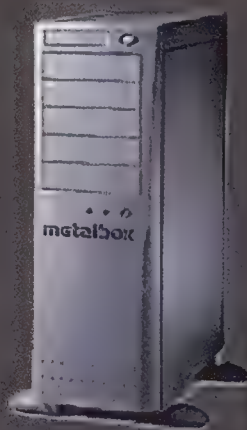
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pt2001 *pt*series BUSINESS WORKSTATION

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256MB Hyundai PCI33
40GB Quantum 7200RPM HDD
Creative I2x DVD Drive
Gigabyte GF2 MX400 64MB w/TV out
Creative DTT5300 + SBLIVE! 5.1 SE
A-Open KF45A (P4) Midi Tower
17" AcerCM V771 Monitor
AcerCM 52G Internet keyboard
Genius Netscroll Intelli PS2
Netcomm 56K Int. Lucent Modem
Temp-Adj 80mm Ball Bearing Fans
Rounded ATA-100 IDE Cable

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Creative I2x DVD Drive
ATI Radeon 8500 64MB DDR AGP
Creative Audigy Platinum
A-Open HX-08 ATX Full Tower Case
AcerCM 19" Monitor
AcerCM 52G Internet keyboard
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Heatsinks

Metalhead, Asher Moses, embarks on a magical journey to find out where heatsinks come from.

Around three years ago, a chunk of aluminium with a small fan was all that was required to cool your processor. This was mainly because overclocking was not as popular or as easily done as it is today, and the heat older CPUs produced was also quite low. Now three years later, much has changed. Overclocking has risen tremendously in popularity, with publications devoted to teaching consumers how to squeeze as much performance out of their processors as possible. This obviously resulted in a demand for more effective heatsink designs to not only cater for the overclocking community, but just to cope with the heat produced by today's CPUs. This in turn created a huge market niche, with new heatsinks popping up every day, each with a unique and innovative design. While most of these heatsinks have been made out of either aluminium or copper, some companies have gone to extremes and produced heatsinks made out of silver and in some instances gold. With so many heatsinks available, it is tough to make a decision on which to purchase.

Materials

The basic purpose of a heatsink is to remove heat from the core of your CPU. Therefore, metals with good heat transfer properties are ideal for use in heatsinks. Heat transfer or thermal conductivity is measured in W/cm-K (watts per centimeter per degree kelvin). Thermal conductivity relates to how well a metal can absorb and transfer heat within itself. Different metals conduct heat differently because thermal conductivity is strongly driven by the interaction of electrons throughout the material. In the case of (most) metals, electrons are shared as members of a collective 'whole' in which they float rather freely from one atom to the next. The more easily these electrons can move through the atoms, the better that metal will conduct heat. The small table on this page compares the thermal conductivity

Metal	Thermal Conductivity (W/cm-K)
-------	----------------------------------

Copper	3.937
Aluminium	2.165
Silver	4.173
Gold	2.913
Diamond	6.299

of a few different metals.

While diamond and silver conduct heat the best, most manufacturers have opted to make their heatsinks mainly out of aluminium. This is because aluminium is much easier to obtain, not to mention significantly cheaper. Can you imagine how much you would have to pay for a heatsink made out of pure diamond? Copper has also become a very popular material among heatsink manufacturers because it features good thermal conductivity properties and costs a fraction of what you'd be paying for silver, gold or diamond. However, as copper is much harder to machine than aluminium, a lot of manufacturers have stayed away from it to keep production costs down.

Another thing manufacturers look at when designing a heatsink is the thermal convection properties of a metal. While thermal conductivity refers to how well a metal absorbs and transfers heat within itself, thermal convection refers to how well a metal transfers the heat to a liquid or gas (for example, air). Air unfortunately does a rather poor job of conducting heat, which is why we usually see fans attached to the heatsink. When an object such as a fan is used to force the air across the heatsink, it is called forced convection.

The final important thing to look at when deciding on a metal for a heatsink is its ability to emit radiation. Radiation is the emission and propagation of energy in the form of rays or waves. In the case of a heatsink, the energy that is going to be emitted is heat. Black objects tend to emit energy very well. This is why we have seen many black coloured heatsinks in the past. This doesn't mean you should just go out and paint your heatsink, as this will greatly reduce its effectiveness because the paint will act as an insulator. Heatsinks get their colour from a process called anodizing, where their surface is coated electrolytically with a protective or decorative oxide. While a black heatsink will emit large amounts of radiation, most of the heat will be dissipated using convection. The performance difference between an anodized black heatsink and an identical heatsink of a different colour will be negligible. Other than looking cooler. And who wants to compromise performance for aesthetics?

Design

Though the material used is a key factor in determining the performance of a heatsink, another very important aspect is the design. When I say design, I mean the heatsinks' shape, size, fins, pins and so on. First, the larger the heatsink's surface area, the more heat that will be transferred.

Surface area is basically the amount of the heatsink's surface that is exposed to the air. This is why, rather than making a heatsink one solid block, manufacturers often include fins or pins on their heatsinks to increase its surface area without increasing the size of the heatsink itself. The surface of each fin is often ribbed as well, increasing surface area even further. The base of the heatsink should be flat to allow heat to easily transfer from the CPU, to the heatsink and into the fins where the heat is dissipated. The heatsink's fins should also be aligned vertically so air can flow freely through the heatsink. To make them more attractive to the consumer, manufacturers also tend to anodize their heatsinks. As mentioned earlier, the colour of the heatsink can also determine how well it radiates heat, however; there will be no real-world performance difference. Make sure you do not purchase a heatsink purely based on the way it looks. Keep in mind that sometimes units are not scientifically designed for maximum performance, but rather designed with aesthetics mainly in mind. This can be very off-putting to the unsuspecting consumer who will most probably purchase a heatsink because it looks better. A lot of the time the simplest looking heatsink can perform the best.

Manufacturing methods

Heatsinks can be classified in terms of manufacturing methods and their final form shapes. The most common types of air-cooled heatsinks include stampings, extrusions, forging, bonded/fabricated fins, die castings and folded fins. Following is an explanation of each technique.

- **Stampings:** Copper or aluminum sheet metals are stamped into desired shapes. They offer a low cost solution to low density thermal problems. They are suitable for high volume production, because advanced tooling with high speed stamping would lower costs. Additional labour-saving options, such as clips and interface materials, can be factory applied to help to reduce assembly costs.
- **Extrusions:** This is the most popular method of manufacturing heatsinks. Extrusion is the process by which long straight metal parts can be produced. It is done by squeezing metal in a closed cavity through a tool, known as a die, using either a mechanical or hydraulic press. After the metal has cooled, it is cut to the size you want the heatsink to be, based on motherboard standard sizes.
- **Forging:** This is the process whereby metal is heated and shaped by plastic deformation by suitably applying compressive force. Usually the compressive force is in the form of hammer blows using a power

hammer or a press. Heatsink manufacturers rarely use this method but it is used occasionally, and is definitely worth mentioning.

- **Bonded/Fabricated Fins:** Most air cooled heatsinks are convection limited, and the overall thermal performance of an air cooled heatsink can often be improved significantly if more surface area can be exposed to the air stream. These high performance heatsinks utilise thermally conductive aluminum-filled epoxy to bond planar fins onto a grooved extrusion base plate.
- **Die Castings:** Die casting is where the metal is injected into the mould under high pressure of 1,450–30,500psi. This results in a more uniform part, generally good surface finish and good dimensional accuracy, as good as 0.2% of casting dimension. In other words, you can make more complex shapes using die casting than you can using other methods such as extrusion.
- **Folded Fins:** Corrugated sheet metal in either aluminum or copper increases surface area, hence the volumetric performance. The heatsink is then attached to either a base plate or directly to the heating surface via epoxying or brazing. It is not suitable for high profile heatsinks on account of the availability and fin efficiency.

Fans

Almost all of today's CPUs (with the only exception being VIA's C3) require a fan attached to the heatsink to keep them sufficiently cooled. When choosing a fan to go with your heatsink, there are a few important things you should look at. The first is the type of fan. Two types of fans that usually come with heatsinks are ball bearing fans and sleeve bearing fans. Most people prefer ball bearing fans rather than sleeve bearing fans because they spin faster, thus increasing cooling performance. Sleeve bearing fans have also been known to fail when they get old, which would be a disaster, especially for owners of AMD processors, since seconds after the fan stops working, the processor will be fried. A good way to tell if your fan is of good quality is to carefully listen to the sound it makes while it's running. You should just hear the sound of the air flowing, which can sometimes be rather loud depending on the speed of your fan. You should not hear a buzzing sound and if you do, chances are your fan's motor is poor. If you would like high performance and do not mind a high noise level, I recommend a 7,000rpm ball bearing fan. However, if you would like a relatively quiet PC, you should be looking at a fan that rotates at around 4,000rpm.

'Most thermal compounds consist of silicon, silver and metal oxide. This is because these materials provide especially high thermal conductivity.'

Testing the theory

While all this may look good on paper, it is useless if there is not a significant performance difference. To show you just how important choosing the right heatsink unit is, I compared the Globalwin CAK38 to a stock heatsink/fan unit that is usually bundled with AMD processors. The CAK38 features all the right components for a high performance heatsink. It is made out of pure copper, features many thin fins for increased surface area and is cooled by a very effective 7,000rpm fan. The AMD stock heatsink on the other hand is a block of aluminium with fewer, thicker fins and is cooled by a measly 4,800rpm fan. Both coolers were tested on an AMD 1.2GHz Athlon Thunderbird processor and the temperature was measured using a Senfu Thermometer Probe.

Thermal Interface Material

To have the best possible heat transfer, the base of your heatsink has to be flat and free of air gaps. While a heatsink's base may often seem flat, there are always tiny bumps and dents that you cannot see and no matter how much you lap your heatsink (see *Issue seven, page 92*), you will never get it perfectly flat. To combat this problem, a TIM (Thermal Interface Material), such as a thermal compound or thermal pad, is used. A thermal pad usually comes preinstalled on a heatsink and is made out of graphite or some sort of polymer. While no installation is required and they are all that is needed for most users, the performance they offer is far inferior to that of a thermal compound. A thermal compound is a paste that is applied to the CPU or the heatsink. Most thermal compounds consist of silicon, silver and metal oxide. This is because these materials provide especially high thermal conductivity.



To make things fair, I tested the stock AMD heatsink with a 7,000rpm fan as well as its stock fan. To make sure the processors were running at full load, I ran an hour of Quake 3 Arena loops with Prime95 running in the background.

As you can see from the test results, choosing the right heatsink is very important. The Globalwin CAK38 was able to outperform the stock AMD heatsink by 10°C when running with stock fans, and by 5°C when both heatsinks had 7,000rpm fans installed. This is a huge difference and it is clear why many users do not even consider using stock heatsink units with their processors. This applies even more so to overclockers. Hopefully, armed with the knowledge given to you in this article, you will be able to make a much more educated decision when purchasing your next heatsink/HSF combo.

Heatsink Temperature

Globalwin CAK38	46
AMD Stock (4,800rpm)	56
AMD Stock (7,000rpm)	51

The future of heatsinks

With processors rapidly evolving and therefore the requirements for more effective cooling solutions, a lot of you may be asking, 'Will there be a time when an air cooled heatsink will not be sufficient cooling for a processor?'

Well, as long as alternatives such as water cooling and peltier cooling remain expensive and difficult to install, air cooling will continue to be the preferable choice among most users for some time to come.

That said, as processors get faster and hotter, we will most likely see more heatsinks made out of better heat conductors, such as silver, because aluminium and maybe even copper may not be able to cope with the heat output of future processors and even chipsets.

In an ideal world, as processors evolve they should somehow generate less heat, thus allowing heatsink manufacturers to focus mainly on producing a cost effective, low noise computing solution. And thermal management is a big issue for processor manufacturers during research and development. But, as they say in latin though, 'Tempus Omnia Revelat' (time reveals all). So I guess we'll just have to sit back, wait and see.

O

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FAT vs. NTFS

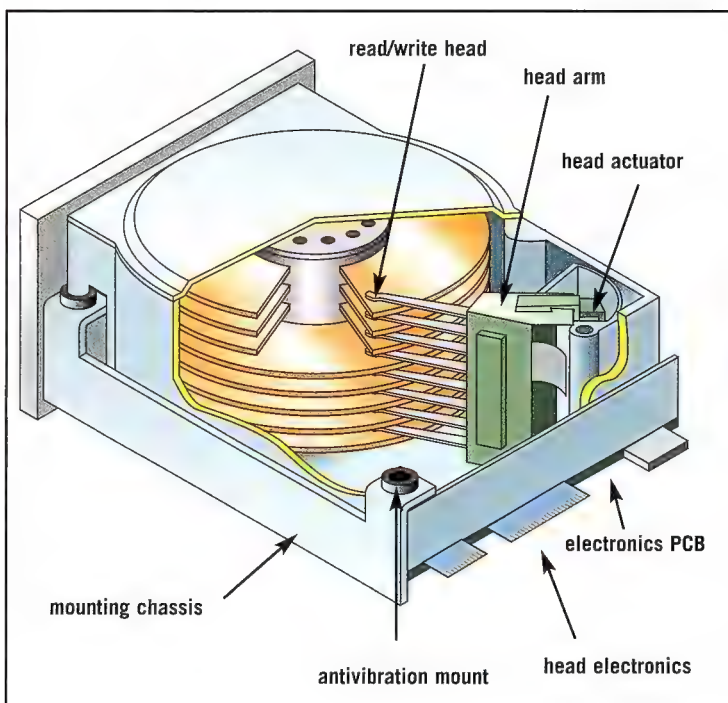
Filophile Asher Moses puts everything in the right place.

Over the years hard drives and the systems used to store data on them have constantly evolved as storage capacity has skyrocketed and newer operating systems are born. Though the two latest Windows file systems, FAT32 (File Allocation Table) and NTFS (NT File System), look fairly similar on the outside, they have some fundamental differences in both design and target, and each of them has its own set of advantages and disadvantages.

The physical disk

Before file systems can be understood, the design of the physical disk itself must also be understood. The type of physical disk that the majority of people are used to is a hard drive. Also known as fixed disks, these are where the vast majority of computers store their operating systems, programs and file data. Hard drives contain several platters, which are made up of either aluminium or, more recently, glass.

Glass is used in the newest and largest drives because the platters can be made thinner, and they are more resistant to the heat that the drives generate. In order for the platters to be able to store information, they are coated with a magnetically sensitive material, primarily containing iron oxide and cobalt alloy. The data on the platters is accessed by a head, which is moved by the head arm. There is usually one head per platter side.



The basics

Operating systems all need a way to manage the often vast amounts of data that is stored on a hard drive. This is where file systems come into the game. Just as people bravely attempt to organise CD or DVD collections in some kind of logical order for easy retrieval at a later date, operating systems need a system for the organisation of files for retrieval and storage.

File attributes

A file can be thought of as an abstract data type. The attributes that most operating systems would give to a file include the following:

Name – This is the attribute of the file that computer users are used to seeing on a regular basis. It is simply the symbolic name of the file.

Type – The type of a file defines what operations can be performed on it. Types of files include executable, text, image and so on. The operating system usually handles the association of certain actions with each type of file (for example, open with Microsoft Word, or execute).

Location – This is a pointer to the file on the device on which it resides (for example, a hard disk drive).

Size – This is the size of the file, usually in bytes, words or blocks.

Protection – This is usually specified by a user, and defines the level of access that other users can have. Levels include reading, executing, writing and so on.

Time, date and owner – Most operating systems usually keep track of a file's creation, last modification and last use date and time. Certain operating systems (such as Windows NT) also keep track of who created the file.

File operations

As an abstract data type, there are several different operations that can be performed on a file. The operating system provides these operations as system calls. The basic file operations include:

Creating – To create a file, the OS must allocate the proper amount of storage space. Then an entry into the file's directory is made for a user to see that the file is in that directory.

Writing – To write to a file, the operating system controls a write pointer, which specifies the next location to write to. Whenever a write occurs, this pointer must be updated.

Reading – Much like writing, the operating system controls a read pointer, which specifies the next location to read from. Once a read occurs, the read pointer is updated.

Deleting – The operating system first locates the proper file to delete. Once it is found, the space associated with the file is freed, and its entry in the directory is removed.

Tree directory structure

A directory is what allows users to organise files according to their purpose. The most common directory structure is the tree structure. In this type of structure, there is a root directory, which contains files and subdirectories. The root's subdirectories can contain other directories and files. These subdirectories can contain other subdirectories.

FAT32

The FAT32 file system was first introduced with Windows 95 OSR2, and later appeared in Windows 98, 2000 and XP. Its predecessor, FAT16, was introduced way back in 1977 with MSDOS, which was a 16-bit operating system built around 16-bit x86 computer architecture. This file system is now starting to show its age. FAT16 can only handle a certain amount of clusters per partition, which means that as the partition size increases, so does the size of each cluster. In theory, this means in a 4GB partition, each cluster is 64KB, so if you have a file that is 71KB it will take up 128KB in space, using two 64KB clusters. While this may not seem like much, it sure adds up on larger drives. The other disadvantages of the FAT16 file system are, it doesn't support compression or encryption as part of its security model.

The FAT32 file system, though very similar to FAT16, allows a larger number of clusters per partition, with each cluster much smaller. For hard drives under 8GB, each cluster is only 4KB, improving the overall disk utilisation. Unfortunately, like FAT16, the FAT32 file system does not support compression or encryption as part of its security model.

However, the thing that the FAT16 file system has that FAT32 doesn't is wider operating system support. The FAT32 file system is not supported by Windows 3.x/NT 3.5/4.0, Linux or Unix.

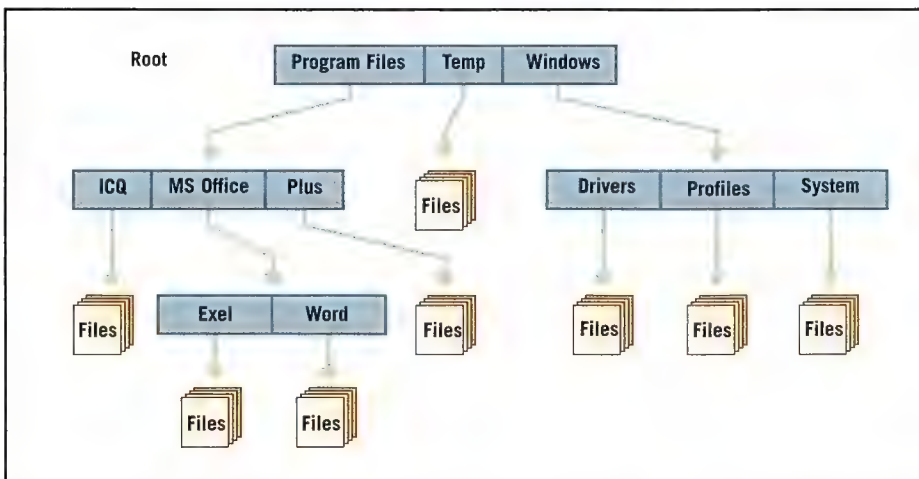
The basis of the file system is the File Allocation Table (FAT), which is stored on a portion of the disk or partition. Simply put, this is a linked list, with one entry for each block of space (cluster) on the disk. A directory entry contains the number of the first block used by the file. The FAT entry at that block contains the number of the next block, and so on. Unfortunately, when files are accessed under the FAT system, the disk drive's heads must be

constantly repositioned between the FAT and the file itself. This can lead to decreased performance when used on large partitions.

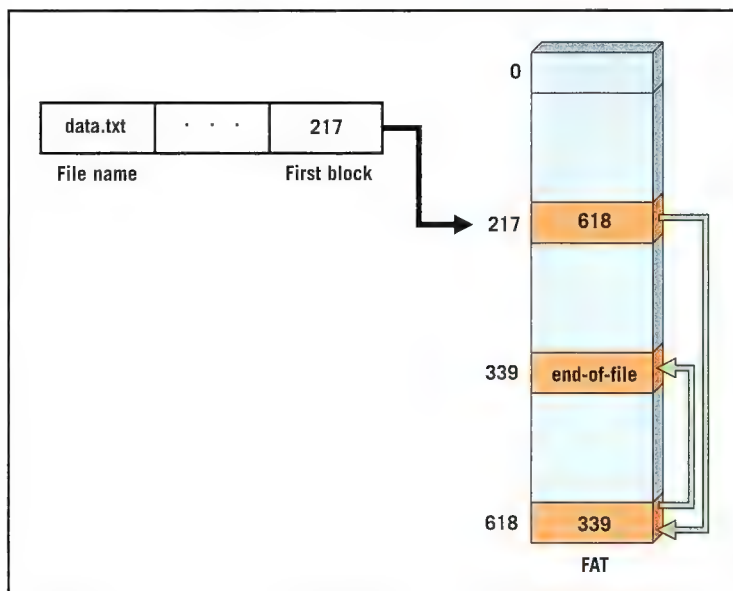
If you are multibooting different operating systems, a FAT16 file system would be a better choice than NTFS, mainly because many operating systems such as DOS, Windows 3.x/95/98/2000/Me/XP/NT, Unix, Linux and OS/2 support the FAT system. Another benefit of FAT32 is its low overhead on smaller partitions; for this reason the file system is the better choice for partitions under 200MB. In its current incarnation, included with Windows XP, FAT32 has an upper limit of 32GB. Finally, another benefit that DOS users may recognise – undelete utilities. These utilities directly access the system's hardware, which Windows NT does not allow. However, if a system can be restarted into DOS, any FAT/FAT32 partitions can be accessed by undelete utilities with some degree of success.

NTFS

The NTFS file system was first introduced with Windows NT, and later with Windows 2000 and XP. NTFS is a relatively new file system, and was developed with the downfalls of other file systems in mind. Microsoft intended it to be robust, secure >



Name	Record	Description
\$MFT	0	Master File Table
\$MFTMIRR	1	Copy of the first 16 records of the MFT
\$LOGFILE	2	Transactional logging file
\$VOLUME	3	Contains volume serial number, creation time and dirty flag
\$ATTRDEF	4	Attribute definitions
	5	Root directory of the disk
\$BITMAP	6	Contains drive's cluster map (in-use vs. free)
\$BOOT	7	Boot record of the drive
\$BADCLUS	8	Lists bad clusters of the drive
\$QUOTA	9	Contains user quota information – unused before NT 5.0 (Windows 2000) NTFS
\$UPCASE	10	Maps lowercase characters to their uppercase version



and fast. The key advantage that its developers had was, they were starting from scratch and did not have to retain compatibility with a 20-year-old file system. Similar to FAT32, NTFS stores files in clusters of sectors on the hard drive. The NTFS cluster sizes are much different from FAT32. NTFS clusters are addressed from the beginning of the partition to the end with Logical Cluster Numbers (LCN). Using an LCN address, the physical disk offset of a file can be calculated by multiplying the LCN by the cluster size.

Each file that is located on a NTFS partition has a unique ID called a file reference. This number contains a 48-bit file number and a 16-bit sequence number.

Partition size	Cluster size
0MB - 512MB	512 bytes
512MB - 1GB	1KB
1GB - 2GB	2KB
2GB+	4KB

The sequence number is incremented every time the Master File Table (MFT) entry is reused. It is used by NTFS for internal consistency checks. The full 64-bit address is the record number in the MFT that describes the files. One or more records in the MFT describe a file's attributes, including security settings. The MFT contains at least one entry for every file on the NTFS volume, including the MFT itself. It has pre-assigned base records, which are associated with the disk management. These are known as metadata files. Records in the MFT contain four basic fields. The first field is a header, which contains basic information about the record. This is followed by one or more attributes that describe the characteristics of the file or directory that the MFT record represents. The header data includes the 16-bit sequence number, a pointer to the first attribute in the record, a pointer to the first free byte in the record, and the MFT record number.

An NTFS partition provides high levels of security for its contents because of its tight integration within the NT security model. File level security is provided by NTFS for setting permissions of files and folders. Windows NT then gets and sets this information for each user. When a user is logged on, the NTFS permissions determine what a user has access to, providing a very secure environment. This file level security leads to another security feature of NTFS; a partition cannot be

accessed if the system is booted from a DOS disk, as NTFS requires a user to be logged into the system, with username and password, before they can read from the partition. When NTFS writes to disk, file I/O events are recorded to a transaction log. The transactions are not committed to disk until the action is successfully completed. Therefore, if a crash or power interruption occurs, this log can be used to restore the partition and prevent corruption.

Another feature of NTFS is a background housekeeping process that automatically prevents data from being written to bad disk sectors. Since this is done in the background, a process accessing the disk will never know that the bad sector exists.

One of the design goals of NTFS was speed, and NTFS provides excellent performance on large disk partitions. This only comes into play when the disk partition is larger than 400MB because of NTFS's relatively high overhead. Another way to increase performance in NTFS is with its binary tree structure for directories; this reduces the number of disk reads required to locate files. In addition to this, files in each directory are sorted on the fly, providing faster access to them. Along with NTFS's performance increases as seen by its file storage techniques, its resistance to fragmentation is also a benefit. When NTFS writes to the disk, it makes 'intelligent' choices about where to store files. This is not to say that fragmentation doesn't occur. Once a partition starts running out of disk space, NTFS will start to use space exclusively used for the MFT, and it is at this point that fragmentation becomes a problem on NTFS, as both files and MFT compete for limited space on the disk.

Summing it up

FAT

Advantages

- Excellent performance on partitions under 200MB
- Able to use undelete utilities
- Compatible with many different OSes, and is often used as the primary partition on multiboot systems

Disadvantages

- Performance decreases on partitions over 200MB
- Insecure
- Prone to fragmentation
- Directory structure has no formal organisation

NTFS

Advantages

- Very secure
- Excellent performance on partitions over 400MB
- File and directory structure enhances performance
- Reliable, less prone to corruption or fragmentation

Disadvantages

- Poor performance on partitions under 400MB
- Not supported by many operating systems

The bottom line

For users of most Windows-based OSes, there are two choices of file system: NTFS and FAT32. While FAT32 has advantages, NTFS has greater benefits. With the possible exception of a multiboot system, or a single boot of Windows 9x, NTFS is the choice for a reasonably fast, reliable and secure file system. □

Christmas II: The revenge

Thanks to a set of handcuffs and Santa's address, Atomicans get not one but 12 Christmasses.

NaturalPoint TrackIR

'Look! Something moved!'
'Kill it dude, fully!'
'Where'd the biatch go?'
'Behind you!'
'I see it! But I just broke my neck!'
'Bummer, dude.'
'Yeah, but I killed the biatch.'



You too can have this much fun, courtesy of the stupefyingly high-tech NaturalPoint TrackIR, as reviewed in Atomic Issue twelve.

WOotY thanks to Ability Tech (www.abilitytech.com.au) for this \$240 wunderthing.

Q: What head-tracking device is used for targeting on AH-64 Apache attack helicopters?

Red Ant Shattered Galaxy

This game is pretty darn cool, with a focus on action, action and more action (with RPG elements).

Because the game takes place in deep space you need a way of keeping in touch with your teammates when offline, so you'll score a Shattered Galaxy radio as well as a copy of the game, which can be wired up to your tinfoil hat to decipher the messages sent to your brain by aliens. There's also a pack of Shattered Galaxy cards, which can be used to unlock a special unit that mere mortals can never access, all thanks Red Ant (www.red-ant.com.au).



Q: What is the nearest galaxy to ours, and how many light years away is it?

Quake 3: Arena Linux autographed

It's time to start firing and bouncing high in the air in a very deathmatch style celebration dance, because you can score a copy of Quake 3: Arena. For Linux. That's right, not only can you play Quake 3, but you can also do it on a free operating system, with big thanks to Anthony



from Everything Linux (www.everythinglinux.com.au). Each copy comes in a shiny tin box and has been signed by id CEO Todd Hollenshead, the guy who orders Carmack to get him coffees. You can't get much cooler than that.

Q: On what newsgroup was Linux first announced?

Return to Castle Wolfenstein

Being Australia, as opposed to Germany, we're able to play RTCW as God intended – which means we can decaffeinate Nazis in a glorious splatter mess. We won't go into the dog shooting issue here, because Atomic is about joy, not tears. Still, you can pretend the Nazis are dogs, which isn't really too much of a stretch of the imagination. You can do the above



thanks to Activision (www.activision.com). There are three Happy Sunny Fun Nazi Schmacking Packs, containing a copy of the Special Edition Tin Can game pack, a RTCW dog tag, which will amaze your friends, plus a bedroom wall RTCW Nazi poster.

Q: What was Basil Fawlty's one rule when dealing with German guests?

Email entries to win@atomicmpc.com.au or post them to: Atomic, Competition Name, PO Box 275, Beaconsfield NSW 2014. The closing date for entries is 20 February 2002. Winners will be announced in Atomic 15.

Atomic 11 winners: THQ Red Faction. Q: What was the first spacecraft to land on Mars? A: Viking Lander 1. N. Hand, Rouse NSW. P. Lopez, Greystanes NSW. Stokes, Georgetown QLD. C. Rabin, Wisman QLD. I. Hagemo, Capalaba QLD. THQ Resident Evil. Q: Is there space in potato cakes? A: No. D. Eldershaw, Parramatta QLD. AMD Athlon XP 1700+ CPU. Q: Complete this word: 'Supercalifragilistic...'. A: ...spinalidocious. R. Reikkinen, Oxley ACT. Logitech MOMO Force. Q: At which track was the French Grand Prix held in 1967? A: Bugatti at Monaco. I. Cohen, Ormeau QLD. Microsoft Office Keyboard + Wireless Optical IntelliMouse. Q: What was the first phrase spoken over a radio transmission? A: 'One, two, three, four, is it showing where you are, Mr. Tresson? If it is, telegraph back and let me know.' Reginald Aubrey Fessenden 1906. M. Duns, Mt. Lawley WA. J. Job, Chippendale NSW. C. Rabin, Wisman QLD. Microsoft Games Packs. Q: What is an Ungulatus? A: hoofed mammal. G.F. Bradley, Arraroo ACT. S. Ryan, Nth Wollongong NSW. C. Block, Allambi Heights NSW. MSI MX400 Pro-VT32. Q: What is Richard Nixon's middle name? A: Milhous. I. Marshall, Warragoba SA. MSI K7T266 Pro2 Socket A motherboard. Q: In which film did Kevin Bacon dance this way into the hearts of a town full of redneck chicks? A: Footloose. I. Miller, MSI EasyNow PDA. Q: What is the longest word in the English language? A: Being the longest word – I don't fit. Check out www.atomicmpc.com.au, we'll put it there, the server can handle it. T. Smith, Lightning Ridge NSW.

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Linux: good for games?

The penguin operating system has long been hailed for its stability and performance. Yeah, but is it good for games?! Ashton Mills investigates.

For as long as the Linux geeks have been raving about their favourite OS, tech-heads on both sides of the OS fence have always wondered, 'Is Linux good for games?'

We've answered this age-old question the only way that matters, the Atomican way: we came, we saw, we drank lots of coke – and we benchmarked. If you don't want to wait, here's the payload: yes, Linux is good for games! Maybe. Nothing is ever black and white is it?

Native Linux games

First, the obvious question: are there any games for Linux? Yes, lots. Many are ports of popular Windows games such as the Quake series, Civilization: CTP, Myth, Soldier of Fortune, Descent 3, Unreal Tournament and Tribes 2 to name a few – and they install and run just the same, if not better (see benchmark scores). There is but one problem with games under Linux – nobody buys them.

Whether it's because Linux geeks are short of cash, or they're so used to the open source philosophy that buying software is a major mental hurdle, who knows, but Linux game company Loki recently filed for bankruptcy protection. Loki was the crowning glory of games for Linux, consisting of a group of talented programmers with a solid service to sell – they'd port Windows games to Linux in return for a share of the profits of the ported game. All the game company needs to do is hand over the source to Loki and then wait for the cash from sales to roll in.

But the sales didn't roll in, Loki ran out of investment capital, and

though Loki is still operating and working on games, its Chapter 11 declaration is a sign of a very uncertain future.

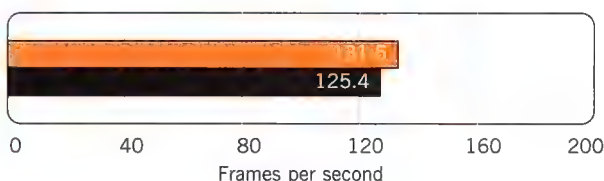
The company that started the ball rolling, however, was id. Before Loki came along id gave the platform major credibility by releasing Linux versions of the whole Quake series. With Quake III Arena the standard benchmarking tool, this is an ideal opportunity to pay homage to id and compare the same game native to each platform. And it appears the feisty penguin has quite a kick in it.

Given that the NVIDIA Linux drivers don't have anywhere near the amount of human power thrown at them as the Windows drivers, these are impressive results. Some hackers need to turn their already overclocked cards into molten slag to squeeze an extra 5fps at 1,600 x 1,200 in max detail. It's also worth noting that Linux was running a number of default services including Web, FTP, security and file services while Windows XP on the other hand was post AXPOG, optimised and nary an unnecessary service to be seen.

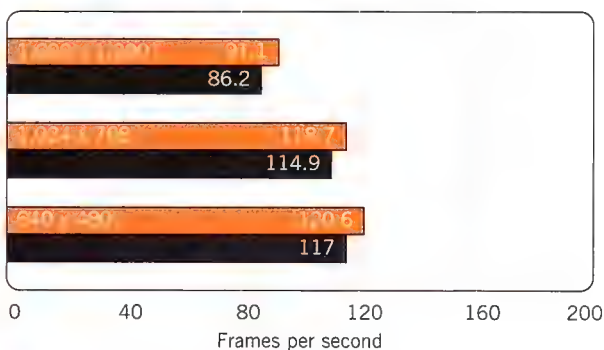
But the average difference of 5fps isn't necessarily a compelling reason to get a crash course in Linux just so you can squeeze a few extra FPS out of Quake. But it certainly makes us wonder – what would be possible if NVIDIA invested as much effort into its Linux drivers as it clearly spends with its Windows lineup?

The CPU benchmark shows that Linux is more efficient, and this directly translates to frames in games – we can see the frames per second gap between the two platforms grow as the resolution increases: higher resolutions require more processing power. Though Quake 3: Arena isn't representative of all games, the benchmarks do show the potential of Linux as a gaming platform, capable of pumping the frames slightly better than its commercial competitor. But it doesn't mean all that much anymore. Windows lays claim to the title as the standard platform for gaming and there's no point reinventing the wheel. When games are released they are released for Windows, because that's where the market is.

Quake 3: Arena 1.30 (CPU)



Quake 3: Arena 1.30 (MAX)



Linux
Windows

Win the 1337est game ever!

What game has 1337er fans a limited edition box set copy of Quake 3: Arena for Linux – also created by id (Q3D Total Holocaust)? Well, we've got it for you by Carnatic. So what? Not just! See the competitions page (page 87) if you'd like one of these Collector's items.

Native Windows games

Linux is nothing if not versatile. There are emulators available for Linux to run most software, including DOS, Mac and Windows programs. Windows, understandably, has been a big focus for the past few years. There are two commercial Linux products, VMware and Win4Lin, that allow you to run Windows (and so all Windows programs) seamlessly on Linux – with the exception of games. DirectX support isn't a priority for these business-oriented products.

But there is also an open source venture called WINE (Wine Is Not an Emulator), which has been slowly reverse engineering the Windows DLLs, and building its own from scratch, for quite a few years now. It's a remarkable piece of programming, because unlike VMware and Win4Lin, WINE is, as its name suggests, not an emulator but rather a 'compatibility layer'. It allows you to run Windows programs as though they were native Linux programs – and the beauty is you don't even need a copy of Windows installed.

Unlike the emulation software of VMware and Win4Lin, however, not all Windows programs run under WINE as they were intended, if they run at all. WINE is still under development, and while Microsoft keeps on releasing new versions of Windows, probably always will be. Using WINE to run Windows programs is a simple hit and miss affair. It really depends on how far the WINE DLLs have progressed, and if they support all the functions the program you are running requests.

Like VMware and Win4Lin, the WINE development team hasn't spent a lot of time trying to code the software for games – but a smart group of people called Transgaming has taken the open source WINE code base and done just that: they've enhanced the all important DirectX side of the deal and created an extension called WineX.

Even before Transgaming came along, a fair few games worked OK – Starcraft a popular example – but now a larger group of games are starting to work fine out of the box thanks to WineX. Native Windows games running under Linux without the need for Windows to be installed? Just for the geek factor alone that has to win the Atomic Supremely Cool Award.

But can it cut the butter? Half-Life and its mods are still some of the most played games on the Net. As a Windows only game, it makes an ideal testbench. There's no need to pimp all the resolutions, we just want to see what sort of performance hit is the tradeoff for WineX.

And the verdict is.



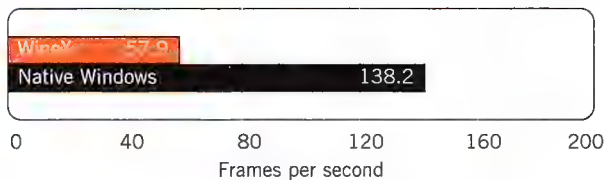
Tux Racer, the popular Linux themed OpenGL game. Penguins have a need for speed.



Linux Unreal Tournament – can you tell?

'If only all Windows games were guaranteed to work as well as Half-Life, the average Linux user could look at Linux as a viable gaming platform for Windows games.'

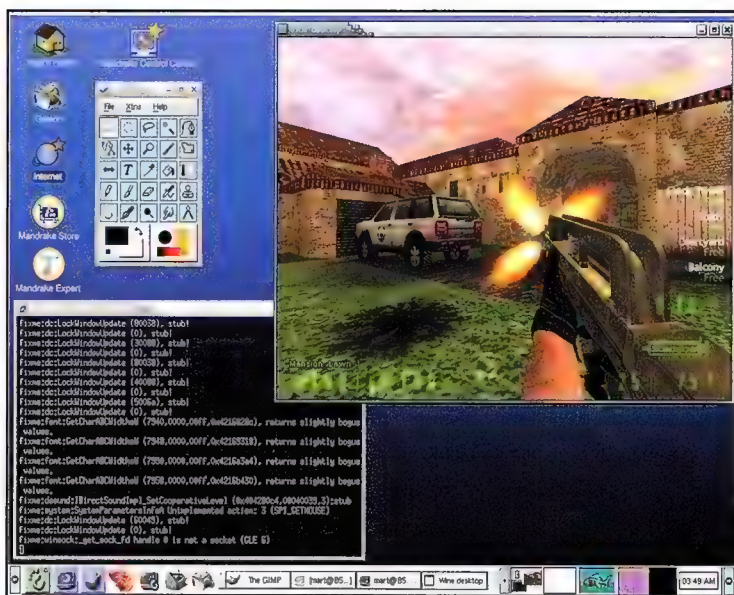
Half-Life (Windows version) – 1,024 x 768



```
[mart@atomic hl]$ cat /proc/cpuinfo
processor       : 0
vendor_id      : AuthenticAMD
cpu family     : 6
model          : 4
model name     : AMD Athlon(tm) processor
stepping       : 4
cpu MHz        : 1500.022
cache size     : 256 KB
fdiv_bug       : no
hlt_bug        : no
f00f_bug       : no
coma_bug       : no
fpu            : yes
fpu_exception  : yes
cpuid level    : 1
wp             : yes
flags          : fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov
pat pse36 mmx fxsr sse syscall mmxext 3dnowext 3dnow
bogomips       : 2994.99

[mart@atomic hl]$ pwd
/mnt/win_c2/hl
[mart@atomic hl]$ wine -- hl.exe -console -game cstrike
```

ⓘ The itty bitty gritty of Ashton's CPU.



ⓘ I am He-Man! I can multitask! And guess what – it's actually stable!

Not too shabby. Windows Half-Life, running under Linux through WineX, clocking up almost 60fps at 1,024 x 768 is admirable. Plenty of power to play with. If only all Windows games were guaranteed to work as well as Half-Life, the average Linux user could look at Linux as a viable gaming platform for Windows games, with there no reason whatsoever to reboot to Windows. But, alas, such games are far from the norm. Using Mandrake's new Gaming Edition distribution of Mandrake Linux 8.1, which bundles access to Transgaming's WineX along with a copy of The Sims, we found very few games worked 100%. Some would start but appear buggy, and others wouldn't load at all. Any DirectX 8 based game is currently off limits. As with WINE, it's just a matter of suck it and see. At only version 1.02 for WineX, it is early days yet, however. For those games that do, or for those games that work fine under WineX, you can happily wave goodbye to your Windows boot. It all depends on what you want to play. Just keep in mind that games will generally be out for Windows first.

How we tested

We used the latest 1.30 point release of Strike 3: Arena for both Windows and Linux platforms. Because this new release is incompatible with our 1.27g Strike 3: Arena AtomicMPC demo, we spent many dedicated hours frantically away to make a new one (hey, someone's gotta do the hard work).

We also used the latest Half-Life, 1.10.0.8, in conjunction with the fast-paced Half-Life mod Front Line: 1.3a (also creating a demo to match), to test the speed of a Windows game running natively under Linux through WINE, a Windows emulator for Linux.

Test system:

AMD Athlon 1.4 at 1.66GHz
512MB Hyundai DDR RAM
Leadtek GeForce3 TD 64MB DDR
Gigabyte 755X with built-in SATA

Operating systems:

Windows XP Professional
DirectX 8.1
Mandrake Linux 8.1 + XP/686 4.1

Drivers:

NVIDIA Windows Extension XP 23.11
NVIDIA Linux 1.0-2314

See Atomic Benchmarks on page 48 for Benchmark settings.

Games that are free

Aside from commercial games ported to Linux or running on Linux through WineX, there is a huge selection of native, open source, Linux games available to play. These range from the truly shocking shareware style games just like you find for Windows and that are better left on the crappy Web sites that are distributing them, through to high-quality, immensely-playable OpenGL based blast tests. Which would you prefer?

One such OpenGL game is Tux Racer, which might be best described as formula one penguin racing! No, it's not penguins driving F1's – the penguins actually are the F1s in this game.

It's one game that is reversing the trend – starting as an open source native Linux game, Tux Racer will soon be available on the shelves as a commercial Windows game. And they said it would never happen – bah! For more on native Linux games check out foundries.sourceforge.net/games or search for the term 'games' on www.freshmeat.net.

Linux as a game server

Linux may not be the client side gaming platform of choice at the moment, but its stability and speed have other uses for games – specifically, serving them.

Gaming companies recognise this and just about any multiplayer game worth its purchase price is released with a Linux-based server. Many Quake, Counter-Strike, Front Line Force, Day of Defeat and Tribes 2 servers to name a bare few games are Linux based. But is there really an advantage to setting up a Linux box as a game server as opposed to a Windows one?

Without the moolah to set up long-term public game servers in the Atomic labs (yet!) we posed this question to the admin of a popular US-based server that runs a variety of games for an international audience. Goofbone, an admin at Spies (www.spies.com), responded:

'Why do we use Linux? It doesn't crash when the game crashes, our main game server has been up since we bought the hardware for it. We run more than one game on a server; we are currently running these games at the moment: Return to Castle Wolfenstein, Front Line Force, Team Fortress Classic, Quake 3 mods (Global Warfare, etc.) and Tribes 2. I've had no luck running multiple games under Windows without slowdowns/conflicts.

'Linux doesn't need to reboot when we add new software. We can rev many of the drivers or add/remove games without interfering with play. We can allow other people to connect to the machine but restrict their access to a single server, and we can run a Web server and various other game tracking and player statistic software on the same machine.'

So there you have it. Linux: good for games? Damn straight – giving you endless hours of interruption free fragging fun as a game server near you.

Want more ?

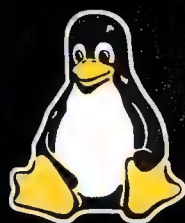
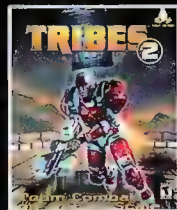
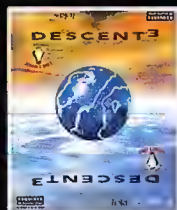
Loki Games www.lokigames.com

Transgaming www.transgaming.com

LinuxGames www.linuxgames.com



BOOM
phone
02 9712-1799



all your favourite linux games @ everythinglinux.com.au

The box on your box

Simon Peppercorn investigates the ultimate indulgence – TV tuner cards.

The art of displaying a TV signal on a PC monitor has been around for many years, but it is far from refined. There are still a number of problems associated with the technology, which are yet to be resolved.

Television is broadcast, in Australia and Europe using the Phase Alternate Line (PAL) system at 25 frames per second (fps), with 625 lines per frame (lpf). NTSC, as used by the US, uses a 525lpf, 30fps format. What you view on your TV screen is a low-resolution image generated by an interlaced scan. Generally, if your mum nagged you enough when you were younger, most people sit two or more metres from the larger TV screens. Any flicker caused by the low refresh rates is barely, if at all, noticeable. However, when an interlaced signal is pumped into your video card and through to a digital CRT, which operates at a different frequency and refresh rate than the signal was intended for, and is often only two feet from your face, then degradation of the visual outputs result.

Manufacturers attempt to minimise these effects by using de-interlacing techniques such as algorithms, which have been integrated into the chipset, and use vertical temporal filtering, median filtering and motion, and compensated median filtering. These algorithms are relatively simple, but not nearly 100% effective. More advanced algorithms are possible, but the cost of integration would render the chipsets too expensive and the cost of the TV tuner devices would become prohibitive.

The overall operation of a TV tuner is fairly basic. The RF signal from your antenna or CATV connection feeds into your TV tuner device and is separated from the carrier frequency. The analog signal is picked by a chip, which converts the signal from analog to digital. Most PCI TV tuner cards use either an older Conexant bt848 or the newer bt878 chipset to do this. Video cards with integrated TV tuning often use their own proprietary chipsets. The converted signal is then sent to your graphics chipset for display. No tuner card, its respective chipsets and drivers perform these functions flawlessly.

Despite these limitations there is still a market for these gadgets. After all, how many TVs do you know that allow you to pause, rewind, grab stills or preview 128 channels at once?

There are a few flavours of TV tuners available for the discerning TV tuner connoisseur.

The first is a regular graphics card with an integrated TV tuner, into which you connect an antenna, and also perhaps a VCR or CATV connection, and so on. In terms of TV display performance, these are the better tuners and put little load on your system. Another style of TV tuner comes in the form of a PCI expansion card, which still has most of the functionality found on the integrated solutions.

Many of the newer devices come in the form of an external USB device. However, the results aren't as good and they place the greatest load on your system. The video must be compressed by the tuner before it is passed to the USB bus, then to your graphics card, and decompressed on the fly. The data transfer still takes up most of the bandwidth available to the USB bus.

TV tuner cards generally allow you to capture video from any source, such as VCR, DVD and video camera. There is a whole raft of video editing software packages available on the market, and many of the TV tuners available bundle this type of software.

HauppaugeTV-GO-FM

Price: \$225

Distributor: New Magic

Contact: (03) 9885 5888

TV Quality: 8/10

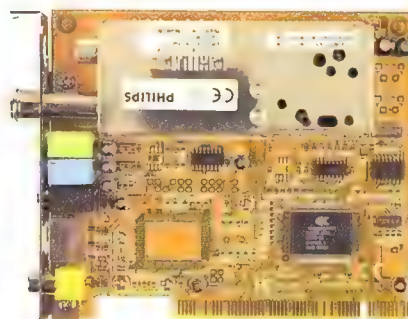
Overall: 8/10

Essentially, this is a PCI version of the HauppaugeTV USB, with the added bonus of a built-in FM Radio tuner. The TV image is smooth and acceptable, though some detail is lost, particularly if the image contains small text. The poor presentation of text is a flaw that many, if not most, of these TV tuners tend to suffer from.

WinTV2000 is the standard application for all Hauppauge TV tuners, and for good reason. This excellent piece of software provides you with the ability to capture stills in a wide range of image formats up to 1,600 x 1,200dpi. Configuration is simple, but allows for a great deal of control. Video can be sampled at 4:2:2, without creating a burden for your CPU.

Teletext is also available and is easy to set up, Although we fail to see why anyone would use it.

This is not a high-end TV tuner by any stretch of the imagination, but if all you want is basic TV or CATV channel surfing, or to catch up on the cricket while at Atomic LAN parties, then this is pretty hard to pass.



Dynalink - Magic TVView

Price: \$189

Distributor: Askey Australia

Contact: 1800 357 253

TV Quality: 6/10

Overall: 5/10

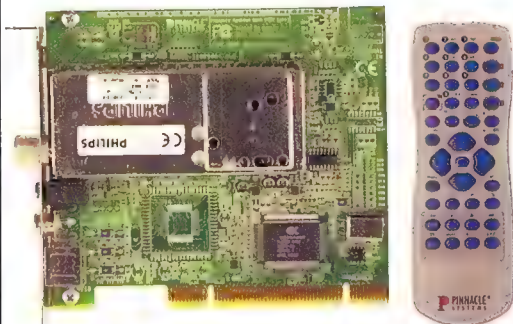
This is one of the more basic PCI TV Tuners, which is reflected in its low price. The software contains all the standard functions used to control TV tuners, but is difficult to configure. Just as disappointing is the image quality; it's merely passable with occasional dropouts and pixelation.

This model features an FM tuner, teletext and a remote control. The drivers and application on the supplied CD-ROM refused to work in our tests, so a visit to the Dynalink Web site for the correct software was necessary to get the card operating. Thankfully, the downloaded versions worked immediately without a single hiccup.

With a Philips tuner and the bt878 chipset found on many TV tuner cards, it is surprising that the performance for this card is not better. The TV interface is clumsy and took some convincing to provide an image.

The card has an S-Video and regular video input, but any audio input from a VCR or DVD player would have to be handled by your sound card.

Move along please. There's nothing to see here.



Pinnacle Systems - Studio PCTV

Price: \$189

Distributor: Pineapplehead

Contact: 1800 657 601

TV Quality: 8/10

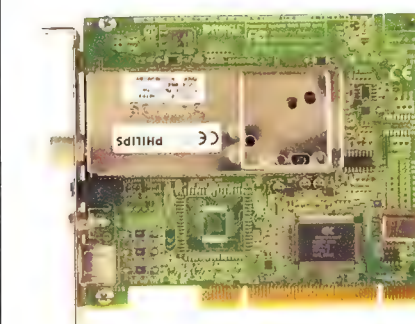
Overall: 7/10

With the same chipset found on the TV Excel, the Studio PCTV tuner surprisingly produced a far superior result.

As well as the standard functionality of a TV tuner, this PCI card also comes with a browser-based teletext application, which is pretty much useless if you have an Internet connection. Who would want to look at shoddy teletext when the joys of the Net are a mere click away? It also features some basic video editing software and is supplied with an intimidating and rather massive 41 button remote control.

The interface is intuitive and configuration straightforward. Image quality was far better than expected. It was difficult to actually want to remove this card from its test bed. So you wonder why Pinnacle hasn't bundled better video editing tools, or included more VCR-like functionality.

Recommended for those who are serious about spending loads of time watching TV on their monitor (even though there is a perfectly good tele in the lounge room).



ASUS V7100 Deluxe Combo

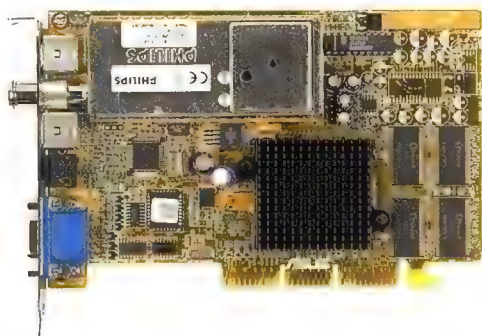
Price: \$389
Distributor: Cassa Australia
Contact: (03) 9874 8703
TV Quality: 9/10
Overall: 9/10

This is the most feature packed card of the bunch. As well as the ASUS Live and ASUS Digital VCR utilities, you get Ulead Video Studio for editing and output in MPEG2 format, ASUS Video Security, CyberLink Video Live Mail, 3D goggles for D3D and OpenGL games, and two 3D games. This is an AGP device, so if you are already attached to your existing card, perhaps you'll be better off looking at the PCI TV tuners.

TV can be viewed through ASUS Live, but fire up the ASUS Digital VCR and you get support for TimeShift. This gives you the ability to record, pause, rewind and scroll forward any video source, including TV. TimeShift cleverly buffers a predefined number of frames to the hard drive, allowing you to shuttle backwards and forwards between them.

The TV image quality is pretty darn good. The only thing that stops this card from getting 10/10 overall, is a 32MB SDR video card – not exactly cutting edge these days.

Recommended for those who would rather watch TV than play Return To Castle Wolfenstein. sif!



TV Excel TV Tuner with FM Radio

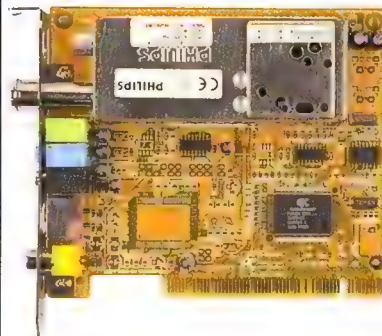
Price: \$145
Distributor: Aus PC Market
Contact: (02) 9817 2899
TV Quality: 6/10
Overall: 7/10

This is very similar to the Dynalink – Magic TVView. In fact, it even uses the same awkward interface. The remote control is optional in this model.

With the bt878A chipset instead of the Bt878KHF, slightly better results are achieved. The picture is clean and watchable, though a little jerky at times. The other thing that sets this apart from the Dynalink model is that there is an audio input on the card, a small blessing when performing video capture functions.

Most TV tuner cards struggle with text from a TV signal. Edges can appear blocky and the way in which compression is handled can often cause the text image to blur. This was particularly significant when using this card, with vertical compression rendering some text illegible.

However, compared to the other cards in this round-up, it doesn't perform too poorly. If it's important to you to be able to capture TV on your PC, then this will do the job, at a price that won't break the bank. Just don't expect to do much more with it than that.



ATi All-In-Wonder Radeon

Price: \$559

Distributor: Servex

Contact: (02) 8745 8400

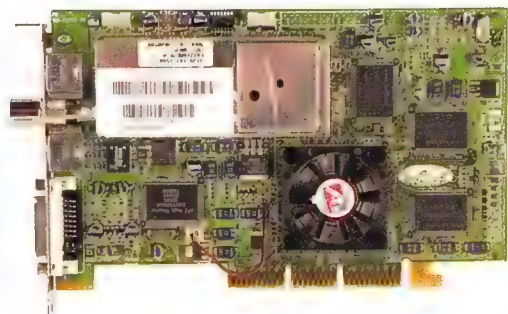
TV Quality: 8/10

Overall: 8/10

The ATi All-In-Wonder replaces your existing AGP card with a Radeon with 32MB DDR, TV tuner and a bunch of other multimedia goodness. The card does a reasonable job translating and displaying a TV or CATV signal. Loads of software features here including 'TV-On-Demand' so you can pause, replay, and schedule recording of TV programs, and it even has a zoom function. This is the only card in this round-up that has a DVI interface for flat panel displays. Fortunately, an adapter is supplied for the not so exotic monitors. As well as the RF connector, S-Video inputs and outputs are present.

Configuration of the TV tuner was straightforward, and the scan for available channels was the quickest of the bunch. Finetuning of each channel is also possible. As with all the cards here, CATV is supported.

A nice well rounded card, though perhaps a little pricey. Due to the high price and ageing 3D graphics chipset, it's not recommended as a gamers upgrade. Use it in a second PC for your multimedia pleasure.



PowerColor MTV 2000

Price: \$126.72

Distributor: Griffler Enterprises

Contact: (02) 9863 5594

TV Quality: 4/10

Overall: 4/10

USB TV tuners cannot be expected to give the same levels of performance as their PCI counterparts, for reasons mentioned earlier. This one is no exception, with a relatively poor (dare I say 'crummy') TV image found on all USB TV tuners.

Installation is as simple as you would hope a USB gadget to be. After plugging the device into a spare USB port, Windows correctly identified the device, and the bundled CyberLink software installed without any problems.

But only supporting a max resolution of 640 x 480, with only the basics of functionality, it would be better described as a video capture device for video conferencing, with the bonus of displaying a TV signal. Teletext and FM radio are available as options, as well as a microphone input. If you're up for some PC based karaoke, this may be the device to satisfy your sick and twisted needs.

This rather odd looking unit is fitted with a magnet, so mounts quite nicely on the side of your case and should attract all the appropriate stares and dumb questions.



TV and PC playing nicely together

Australia and most parts of Europe use the PAL (Phase Alternation Line) method of encoding a TV or video signal. America and Japan use NTSC (National Television Standards Committee) standard. Russia, France and parts of Eastern Europe rely on SECAM (Sequential Couleur avec Mémoire or Sequential Colour with Memory).

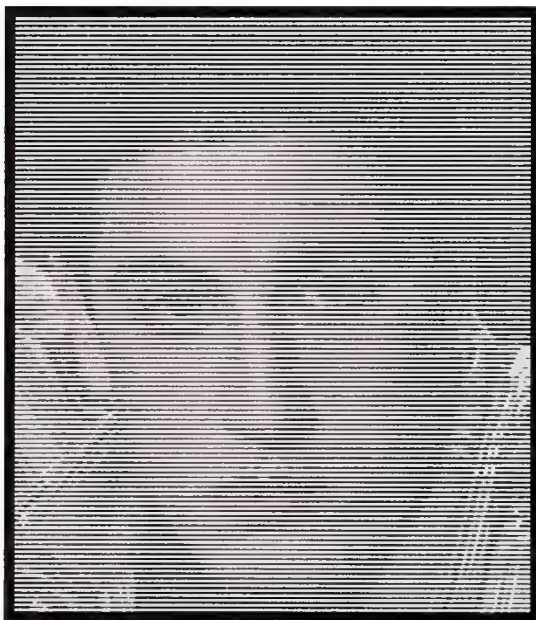
Interlacing occurs when viewing a PAL signal on a television. The picture is drawn from top to bottom, line by line, in two passes. There are 625 lines in total. The odd lines are drawn on the first pass and the even on the second pass. With 50 passes, or fields, every second this equates to 25 frames per second. This is opposed to non-interlaced, which is a digital PC monitor drawing the entire frame in a single pass.

When a video/TV card captures the signal about

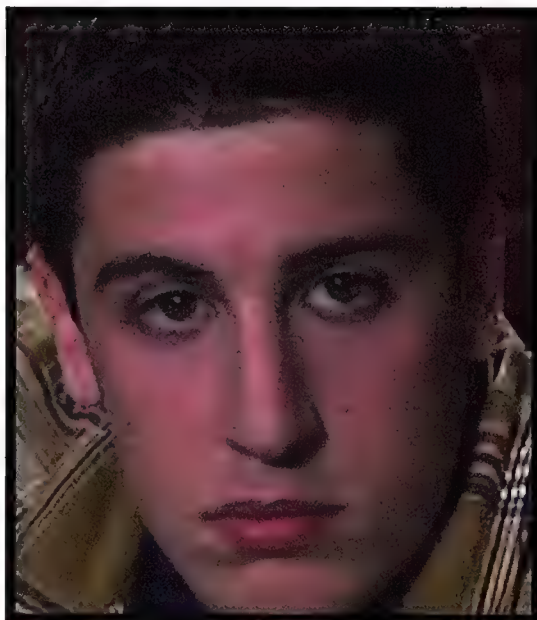
576 of the horizontal lines are grabbed one at a time and split into 768 pixels per line. Each pixel is assigned a colour based on the red, green and blue signal. So 576 lines, divided into 768 segments equals a ratio of 4:3. The remaining 50 or so lines make up the teletext signal.

The US has it a little better. Original PCs were designed so that a regular TV could be used instead of a monitor. Which means that the 640 x 480 resolution of NTSC fits nicely into a VGA display.

Because the human eye is more able to detect changes in the brightness of an image than its colour, a YUV model is used for encoding an image that is broadcasted for television. The U and V represent the signals for the difference in colour. These are processed separately from the Y, which represents the brightness, or intensity. The Y is measured at its



❗ A field, where every other line is displayed.



❗ Two fields make a frame, giving you this ugly gob to stare at.

full resolution and the UV at half. This is known as YUV 4:2:2. Digitising an RGB signal uses 24-bits, whereas the YUV signal only uses 16-bits.

Windows 3.1 saw the introduction of the AVI (Audio Video Interlaced) format and Video for Windows. This allowed the use of compression algorithms, such as Intel Indeo, Cinepak and others. Originally supporting a resolution of 160 x 120 pixels at 15fps, multimedia became mainstream. The AVI format was the default file type for video, however, as the AVI files could not be directly edited, the manufacturers developed their own versions of AVI that could.

An uncompressed video, especially from a PAL source can be enormous. Combined with a 2GB file size restriction in a FAT16 file system, compression and decompression on the fly became critical.

Enter the codec, derived from the words compressor and decompressor. Its job is to compress and decompress the hell out of a video, but not just in file size. The other compression that takes place is in the data rate of playback. A video that has been captured at a data rate of 1MB/s won't play back nicely from a device that can only transfer at 150KB/s. This type of compression assists in streaming across the Internet for those who are still unfortunate enough to be stuck using a dialup connection.

A hardware motion-JPEG codec was, and still is, used by most video capture cards to apply JPEG compression to each frame. This allows

significantly smaller file sizes, and the video can still be edited. MJPEG does generate some artefacts in the image and can cause it to be a little blurry, but these are often barely noticeable.

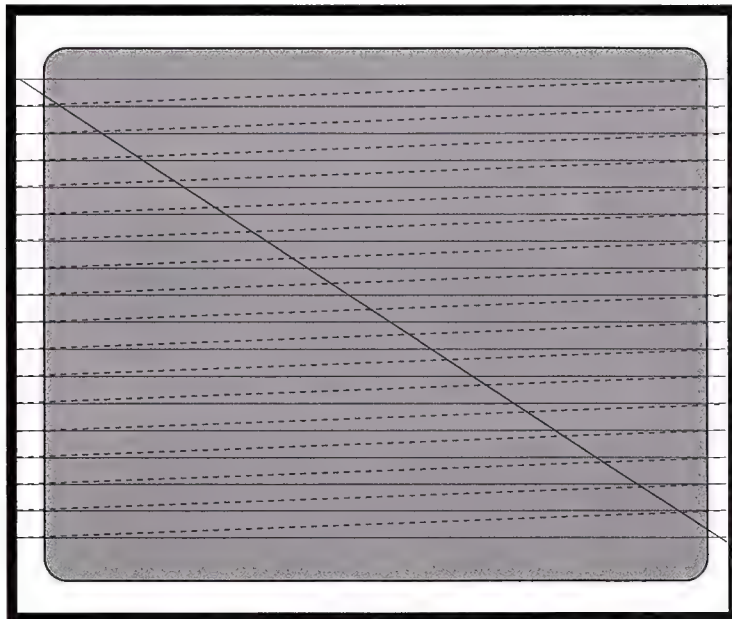
MPEG is a platform independent means of compressing a video. MPEG1 is a low bandwidth solution, from 1-1.5Mb/s, and is ample for very basic video capture functions. MPEG2 provides data rates up to 100Mb/s, and is used by DVD-ROM, digital TV and professional studios. MPEG4 is slightly different. Instead of providing maximum bandwidth, it provides the minimum bandwidth while retaining the best quality video. For the good oil on MPEG4, have a look at

mpeg.telecomitalia.com/standards/mpeg-4/mpeg-4.ntm. MPEG4 is

designed for use in video streaming and has seen the introduction of the DivX ;-) codec, which allows for optimised playback of MPEG4 encoded video in any file format, with built-in de-interlacing support. Tools are available at

www.vcchelp.com/divxcap.htm, which allow video capture directly into DivX ;-) format. A video compressed in the DivX ;-) format is generally only 10-20% the size of the same video in MPEG2 format, which means a feature length movie can often be stored and played from a single CD.

Capturing a raw, uncompressed AVI produces the best results in terms of image quality, and the best results for hard drive manufacturers in terms of the amount of space the resulting files will consume. Don't even bother with this method. You're better off using a codec, you'll thank me. □



❗ The path that a beam takes when it draws to the screen.

Where have all the pixels gone?

Find out all about the pixel-shaded birds and the multitextured bees with 3D geneticist James Wang.

The 3D graphics pipeline is a digestive system; raw numbers enter and eventually photons are expelled.

Conventionally, the pipeline is separated into four states: scene transformation (creation), lighting, triangle set and rendering. In this article, we shall take a look at the most interesting stage – rendering.

Fillrate

Fillrate has become common vocabulary in 3D graphics, and broadly means the rate at which pixels can be produced in a 3D pipeline. From the rendering perspective, fillrate is the single most important number in dictating the speed for any given chip. This is an infectious misconception that has plagued even the most informed consumers. The biggest difference to understand is the difference between peak fillrate and effective fillrate. Fillrate should be renamed theoretical fillrate as it only indicates the maximum or optimum fillrate of a rendering pipeline. Because we live in real world, theoretical fillrate is only useful for the marketing department; effective fillrate is the single most important number for the consumer.

The difference is huge

To see just how massive the difference is, let's look at our favourite resolution: 1,600 x 1,200. A resolution of 1,600 x 1,200 displays exactly 1,920,000 pixels on your monitor. Commonsense suggests that to achieve 60fps all that is needed is to pump 1.92 megapixels every 1/60 of a second, or 115.2 megapixels per second. Even a Voodoo2 came close to this at 90mp/s. Why did it take some four generations later – with the GeForce2 Ultra (1,000mp/s) – before gaming at this resolution and 32-bit colour become possible at 60fps? If we define effective fillrate as the number of pixels that are displayed per second,

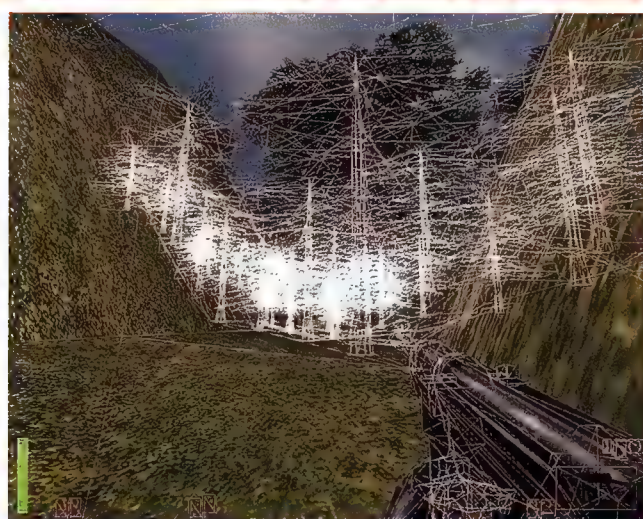
then the disparity between theoretical and effective is almost tenfold! A theoretical fillrate of 1,000mp/s is needed on the GeForce2 architecture before the effective fillrate of 115.2mp/s needed to render 60fps can be achieved. Where did the one billion pixels go? The answer is, not around the corner.


Time for some detective work

The problem is simple: one billion pixels (one gigapixel) should be produced in the beginning of the 3D-core of a GeForce2 Ultra, but at the end of the journey only 115 million appear on the monitor every second. To find out where they went, all we have to do is find out what mysterious mechanism lies in between.

Enemy #1: Scene overdraw

Current architectures draw pixels like mindless zombies, regardless of whether it's visible or occluded. Because 3D games have layers and layers of objects, drawing any pixel that is not the foremost is useless and literally destroys fillrate. While both the GeForce3 and Radeon family both feature explicit hardware design to avoid overdraw, they are nowhere near fully effective. A deferred renderer like the KYRO can achieve near full efficiency. Our games today have an overlay factor of 2.5 to three. Added complexity with smoke and particle effects can increase this to over four (smoke grenades in CS). This number is the divisor for theoretical fillrate. A scene in 3D with an



 This scene from Return to Castle Wolfenstein may look simple, however, there is an amazing amount of overdraw happening as shown in the image on the right.

overdraw of four cuts fillrate by four times is a brute force renderer. It's almost as if four pipelines are down to one! The current methods of checking the depth of pixels early can help to an extent but definitely not by multiple factors.

Enemy #2: Multiple textures

Multiple textures started in the days of GL Quake and Voodoo Graphics. Multitexturing basically combines two or more textures to achieve additional effects that are often too expensive to do in real time. The most common example is combining the base texture with light map textures (in shades of gray) to achieve an atmospheric but static lighting environment. What this means for the graphics pipeline is, if two textures are combined to form the final, then fillrate is halved.

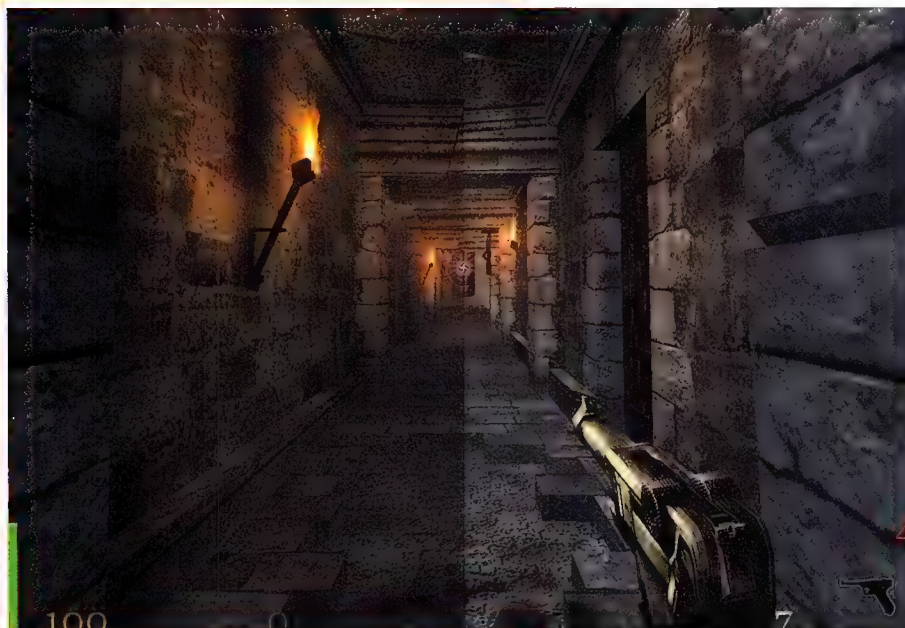
Peak performance

Peak Fillrate (pixels/sec) = No of Pipelines x Core Speed

Peak Fillrate (texels/sec) = No of Texture Units x Core Speed

Peak Bandwidth (bytes/sec) = Bus Width x Bus Frequency

Unlike the problem of scene overdraw, which requires very complex early pixel rejection schemes, there is a rather simple solution to speed up multitexturing, and that is to use multiple texture units per pipeline. The Voodoo2 is the first card to render dual textures at full speed as it included two texturing units in the pipeline. This gave it the 'single pass, single cycle' capability. The KYRO is unique in that it can render up to eight textures in a single pass with only one texture unit per pipeline. The Radeon 8500 can also render more textures (six) than its available texture units (two) in a single pass, and such mechanisms are achieved through a fancy pipeline trick called 'loopback'. Such techniques are invaluable in preserving the colour integrity of pixels while not destroying performance. When ►



The left side uses performance sucking, but moody light maps; the right side uses vertex lighting.



 These scenes from ATI's Radeon 8500 demos show Pixel Shader 1.4 in action.

future games start using four textures for polygons, performance will be severely retarded on present generation cards. The GeForce2's effective fillrate will be cut in half in such cases. A Quake 3 map that was released by PowerVR and that uses four textures, brought performance to near unplayable levels. This is the main reason developers are still not using too many texture layers, but when they do, fillrate will suffer drastically.

Enemy #3: Memory bandwidth

One thing we should all remember is that for any given system, its maximum speed is the speed of its slowest component. Sounds totally wrong? Imagine we have three pipes. If pipe one and three can move 100 units a second, while pipe two in the middle can only move 10, what is the theoretical peak for this system? Ten units per second naturally, its slowest component. The graphics system is no different. It really doesn't matter if your GPU can process 'n' pixels a second; if the bus leading out of the core is only a finite length wide, then that is your ceiling. In the early generation of accelerators, the overall system was balanced such that the peak of the fillrate is around the peak of the memory bandwidth. What really offset the balance was the leap to 32-bit colour. If bandwidth is not a factor, 32-bit performance should be the same as 16-bit, or 128-bit for that matter; no extra pixels are rendered, it's just that each pixel carries more information.

Since in 32-bit rendering each pixel carries twice as much information as 16-bit, the raw bandwidth required is instantly doubled. Another factor is that the speed of the core has increased dramatically through new fabrication processes, while memory speeds have taken much longer to improve.

There are three factors that determine the effective memory bandwidth of a given design: the bus width, memory speed and, the one that everyone neglects, allocative efficiency. Most of us are very familiar with the first two; the standard bus width today is 128-bit (64-bit for value cards), which means 16MB of data can move across in one clock cycle, while memory speed is simply the frequency at which the modules operate. Allocative efficiency will be an important consideration when designing future graphics systems. The GeForce3 is the first design to actually improve this aspect through the use of its crossbar memory architecture. By assigning each pipeline to its own 32-bit bus, the memory controller actually directs the data to be distributed in a more efficient manner. Bitboys' XBA architecture uses a 1,024-bit bus and also segments the bus to achieve greater efficiency. When games start to use pixel and

vertex shaders, memory bandwidth will be even more important than it is now.

100 degrees in the shader

The design philosophy in recent years for 3D chips has changed from trying to obtain the maximum peak fillrate to obtaining the highest bandwidth. This is all part of the bigger picture for higher, real-world fillrate and smarter, prettier pixels. A pixel's life starts in the mind of a 2D texture artist. This person is to blame for the endless tiled walls of gloomy textures and repetitive decals. Current textures are around 128 x 128 pixels large, though quite a few games have used much larger ones.

Shading is the first thing a pixel will have to go through in the rendering stage. Just about every game uses Gouraud shading, which provides a nice balance between quality and performance. It's a fairly simple algorithm that basically interpolates the lighting values of a triangle's vertices across the surface. The result is a smoother mesh; but for low polygon models, highlight detail is lost as there are fewer vertices to base calculations upon. A more sophisticated and costly form of shading involves interpolating not just across vertices but on a per pixel basis. 'Phong Shading' as it is known can produce near photographic quality; but until the Radeon 8500 was unavailable on consumer hardware. The Radeon 8500's pipeline is more flexible than the GeForce3 as it can loop back pixels to avoid multipass rendering. The extra flexibility is reflected in its support for Pixel Shader 1.4, of which one of the features is the ability to Phong Shade. John Carmack has commented that most scenes in Doom 3 can be rendered in one pass on the Radeon 8500; the GeForce3 will require multiple passes.

Shading can also be done through pixel and vertex shaders. OpenGL 1.2 general allows more flexibility than DirectX 8, which is one of the reasons why Carmack opted for GL 1.2 for Doom 3. DirectX 8 is such an inhibiting factor that some of the hardware features in the latest generation of GPUs are yet to be exposed. Once the shading operations are complete, the right pixels have to be sampled for display. Bilinear filtering interpolates the nearest four texels and trilinear blends this with the nearest two mip-map levels. As explained in-depth in Issue ten (page 20), anisotropic filtering uses adaptive shapes to filter texels and achieve great texture clarity. Another DX8 limitation is that trilinear and anisotropic filtering can not be applied simultaneously.

Alpha blending is next up in the pipeline. Alpha values measure opacity and is stored in an 8-bit format as the 'A' in RGBA. This means that 32-bit



As we all now know, it's more than just texturing a wireframe. Mega huge thanks for the above illustration, which was a custom job done for us by Joe Koberstein from Raven. Thanks Joe! The dude above is a Prometheus Soldier from Activision and Raven's Soldier of Fortune 2, an obviously rockin' FPS due soon.

Thanks, Sam

Quantifying the fillrate hits at different stages of the rendering pipeline is a complex process. Thankfully, Sam has a very handy synthetic fillrate benchmark built in (accessed by dropping the console and typing *Benchmark()*). With this test we can see how fillrate hits occur at different stages in the rendering process, and also see the effect that other factors have upon available bandwidth.

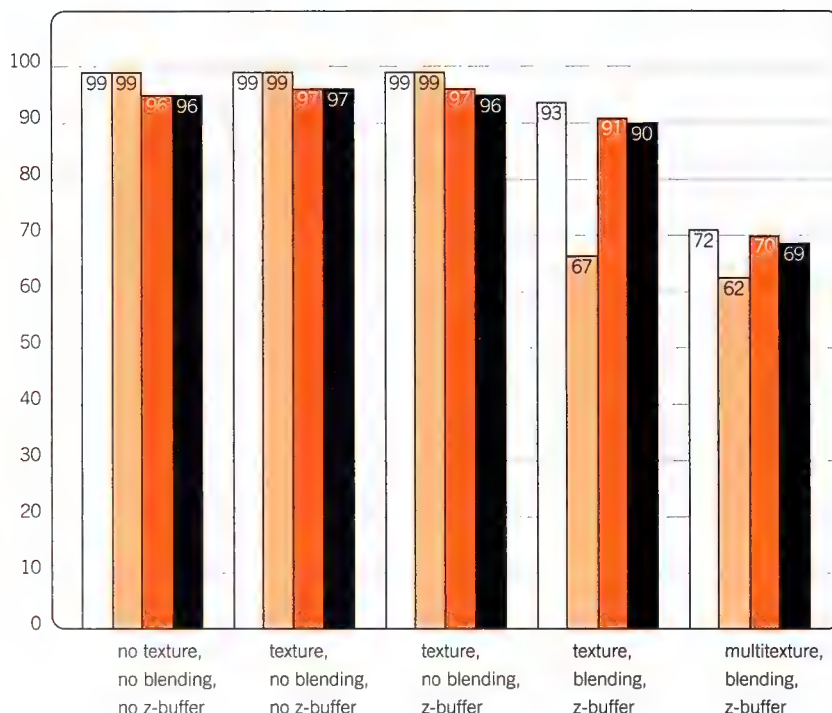
We have taken two renderers and tested them under different situations. Both cards have been tested at varying resolutions and levels of antialiasing. The GeForce3 Ti 500 has been tested using default settings and results were plotted as a percentage of its maximum theoretical fillrate of 960mp/s. The Radeon 8500 has been tested with high quality anisotropic filtering enabled. The results have then been plotted as a percentage of the 8500's maximum theoretical fillrate of 1,100mp/s. Because the cards were tested under different circumstances, the results between the cards are not directly comparable.

The GeForce3 Ti 500 results show mainly the effectiveness of the crossbar memory controller, which makes efficient use of available bandwidth. The resolution of 1,024 x 768 does not really tax the card, however, there is a noticeable hit seen when the full, final image is produced. The picture demonstrated by the Radeon 8500 is much more interesting. With the well-known performance destroying (but oh, so pretty) high level anisotropic filtering enabled, the card does not have the luxurious breathing space seen by the GeForce3 Ti 500. The biggest hit seen in these tests is when antialiasing is enabled, with the fillrate sinking to over half the theoretical maximum under 2x AA and to under a quarter when running under 4x AA. However, one thing to note is that the actual bandwidth slug made by anisotropic filtering on the Radeon 8500 is only in the range of 12% until antialiasing is used. This is noticeably more performance friendly than on other graphics chipsets.

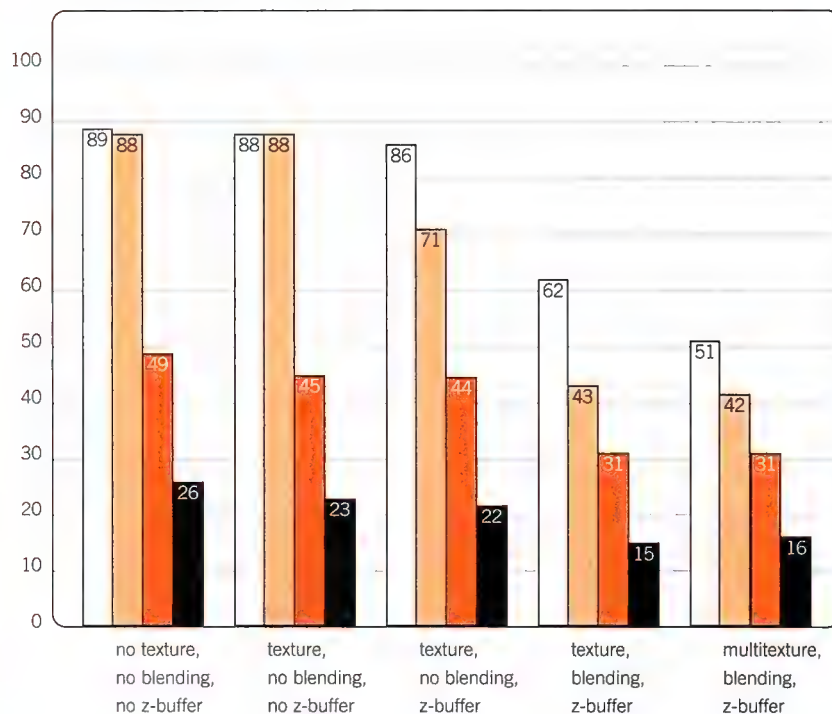
The exact hits seen in a game will be highly dependant upon the game code, video driver version and the inherent strengths of different types of video hardware. Until someone fixes the underlying bandwidth issues, then these problems are here to stay.

John Gilbey

GeForce3 Ti 500 - Fillrate

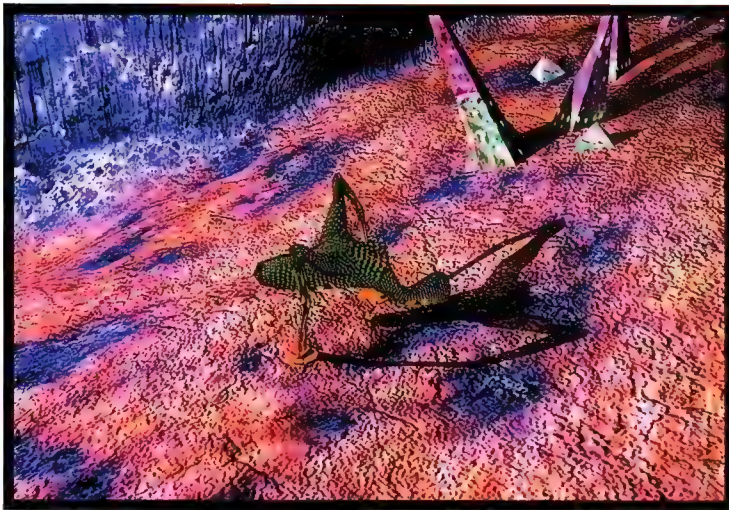


Radeon 8500 - Fillrate



- 1,024 x 768 16-bit no AA
- 1,024 x 768 32-bit no AA
- 1,024 x 768 16-bit 2x AA
- 1,024 x 768 16-bit 4x AA

'Stencil shadows, while capable of creating mind-bogglingly immersive atmosphere, are extremely expensive to compute and are only practical on DirectX 8 compliant hardware.'



① Another ATI PS 1.4 demo, showing realistic shadows falling on uneven surfaces.

colour is actually 24-bit if no transparency is used. The 3D pipeline generally renders back to front when doing alpha blending to make sure the underlying colour is blended correctly with alpha value. Shadows are applied in the next stage, which is typically a combination of high quality pre-rendered lightmaps and approximated dynamic shadows. Volumetric shadows can be created with the use of the stencil buffer. Stencil shadows, while capable of creating mind-bogglingly immersive atmosphere, are extremely expensive to compute and are only practical on DirectX 8 compliant hardware.

Life of a pixel

I was born on 5 March 2000. After I was saved next to the prOn folder of the texture artist, I was promptly promoted to the 3D world; I was modulated with that Gouraud shaded triangle defining the nose of Sarge. My importance was demoted as the smoke from his cigar exhibited obnoxiously high alpha values. My neighbour pixel was even less fortunate as she ended up in the mass grave of Z-rejects, all in the name of bandwidth savings. My virginity was lost on the 11th millisecond of my existence, as Quincunx had me merge with my nearest pixels. Our smoothened form warped through the RAMDAC and, in one brief flash, flew across the evaluated vacuum tube of that sexy SONY CRT. Before I knew it, I re-emerged as a photon, pierced through the cornea and made one nasty mark on the retina. My mission was complete, and he was fragged.

Antialiasing has become an extremely mundane but heated topic for debate on hardware Web sites. One of the most prevalent misconceptions is that multisampling causes texture blurring. This is the conclusion of major hardware sites such as Anandtech and Tomshardware, and it is simply incorrect. Multisampling by nature does not touch textures; it only works on polygon edges. NVIDIA's much touted (and amusingly named) Quincunx is a quasi-multisampling algorithm with an added blur filter designed to enhance performance. The downside of this simplified process is that textures become blurred. If you choose 4x OGMS (Ordered Grid Multi-Sampling) on the GeForce3, you will see that the textures are not blurred at all.

The Radeon 8500 uses an advanced form of SuperSampling, which it dubbed 'SMOOTHVISION'. ATI's method (with its current driver set) is not as performance friendly as its NVIDIA counterpart, but the texture detail is actually improved from the original image. This is actually a side effect of the SuperSampling algorithm; by filtering textures, the result is much improved from plain bilinear filtering. SMOOTHVISION is also the first antialiasing solution that is actually programmable. This means game developers may take SMOOTHVISION into account when designing their games such that antialiasing is only applied to the necessary parts. Antialiasing is also a major culprit in consuming the ever scarce bandwidth, resulting in performance hits that most hardcore gamers are unwilling to stand. Thankfully, for ATI at least, SMOOTHVISION should get quicker as the near daily release of improved drivers keeps moving forward in the pursuit of perfection (or at least stability and decent performance).

The fillrate war is over, only to be replaced by a bandwidth one. We will see pixel numbers become less important; instead the intelligence (IQ) of these pixels will be the focus. This is the view of NVIDIA's own chief scientist David Kirk, but it appears that the Radeon 8500's flexible pipeline has won the first round. Both the NV25 and R300 are close, and with strong rumors about the appearance of a DX9 part from Matrox in 2002 and the bandwidth obsessed Bitboys still breathing, the 3D arena is about to get real interesting again.

012169416240204506500

1. **Introduction**

三行四月

COOL ARMSTRONG COMPACT

 McGraw-Hill

THEIR COMPOUND

이러한 사실은, 이 책의 저자가 이 책의 내용을 구성하는 데 있어 어떤 의도를 가지고 있었는지를 짐작할 수 있게 해 준다. 이 책은, 이 책의 저자가 이 책의 내용을 구성하는 데 있어 어떤 의도를 가지고 있었는지를 짐작할 수 있게 해 준다.

[illegible]

REVIEWS



Now is the time

To upgrade or not to upgrade, that is the question Bennett Ring asks this month.



My favourite time of the year has passed once again. I've done my annual upgrade. And guess what prompted it? My favourite new operating system, Windows XP. There's nothing like a new OS to make your hardware look obsolete.

I was still more than happy with last year's upgrade to a 1GHz Athlon and a GeForce2, but there was an area of my system that Windows XP brought to its knees – system memory. Unfortunately, my ageing 192MB of PC100 SDRAM (running, of course, at 133MHz) just couldn't handle this resource heavy OS at the same time as the even more resource hungry 3D games I use to while away any spare time.

After I saw the impressive benchmark results of John's round-up of the KT266A chipset, there was only one solution. It was time to dive headlong into the realm of DDR. 512MB of it to be exact. One new motherboard, two sticks of 256MB PC2100 DDR and \$500 later, I'm back in action, and boy does it feel good. No more hard drive thrashing just as I'm about to blast some plane/zombie/Georgian rebel into nothingness. Not to mention being able to keep five or six applications running on the desktop at once without a hint of slowdown when switching between them. Luxury!

But how do I know when to upgrade? With the continual release of products, each of which promise to make my PC run faster than ever before, it's tempting to spend every spare penny I've got on new hardware. But over time I've come up with three golden rules when it comes to forking out cash for new gear, so I thought I'd share them with you. I could sell this information, make millions and cripple the hardware industry, but it's my duty as an Atomic writer to tell you guys everything I know for free.

Rule number one. Don't hold off from upgrading forever, waiting for that super duper piece of hardware that is going to be released in six months time. You'll end up waiting your life away, stuck with a system that you're not happy with. You may as well buy the gear when you feel you need it, and enjoy it

while you can; you can't put a price on feeling satisfied with your hardware. It doesn't hurt to wait a little while if a price decrease is on the immediate horizon, but don't get caught in the cycle of waiting for that new piece of hardware that might be released in the next millennium, while putting up with the outdated, cobweb-encrusted hunk of scrap metal you're using at the moment.

Rule number two. Only buy the gear if you're going to see a sizeable increase in performance. This is why I didn't see the need to upgrade my GeForce2 or 1GHz CPU. At the resolutions my el cheapo 19in monitor is capable of, a GeForce2 is only marginally slower than the GeForce3. Likewise with the 1GHz CPU – I wouldn't really have noticed a huge performance increase going up to a 1.4GHz or above CPU, though it is getting closer to retirement age than the video card. A nice rule of thumb I have is, if I can buy a piece of hardware that is 50% faster than my current gear, at the same price I paid for the gear it's replacing, it could well be time to upgrade.

And finally, rule number three, the trickiest rule. There is no point upgrading if the new component is going to be bottlenecked by the rest of your system. For example, buying a brand new GeForce3 to install into your Celeron 300 with a BX motherboard is going to be pointless, as it's simply going to be held back by your CPU. Maintaining a balance with the components of your computer is one of the trickiest things to accomplish, especially when you are only upgrading one or two components at a time.

Maintaining this balance also leads to an increase in the price you'd pay for upgrading a single component. This balancing act changes depending on what you use your PC for. For instance, a server would benefit more from a faster hard drive and additional RAM than a new video card, while a gaming machine would benefit most from a faster video card and CPU. So figure out what you are going to be doing primarily with your system, and upgrade the components that would benefit this task the most.

Upgrading is commonly seen as one of the biggest problems with the PC, as it always seems as if your PC is continually falling behind the cutting edge. However, it should be viewed as one of the biggest advantages of the PC over closed box systems, as it enables you to constantly keep your machine up to date without having to buy an entirely new system.

We upgrade for the same reason as the IT industry – for the constant improvement of PC technology – which means that each year it becomes a much less costly affair to bring your PC back up to the ranks of Über Beast. So start saving those pennies, so you too can enjoy the smell of fresh hardware soon.

Atomic benchmarks

Take a look inside the Atomic Labs testing procedures.

Here at Atomic it is our primary intention to give you the final word on the latest in hardware and PC technology. An integral part of determining the performance of a particular piece of hardware is benchmarking, and this is something we take very seriously in the Atomic Labs.

SYSMark2001

SYSMark is a product of the collaboration between industry group BAPCo (www.bapco.com) and MadOnion.com (www.madonion.com). It is the first of the next-generation application benchmarks and is designed to more accurately replicate the day-to-day workload that a system is subjected to. The benchmark focuses on Internet Content Creation and Office Productivity tasks in order to generate a final rating.

SiSoftware Sandra 2001 Professional

Sandra, from SiSoftware (www.sisoftware.co.uk), is a comprehensive benchmark and diagnostics utility. It contains dozens of special module applets that retrieve detailed information about the specifications and settings of a system, by polling each component's built-in firmware or BIOS. Sandra also features a small suite of synthetic benchmarks for specific components such as CPU, memory, CD-ROM and hard disk. It also features a burn-in wizard for stress-testing overclocked systems.

3DMark2000 Pro

3DMark2000 Pro from MadOnion.com is a powerful benchmark for testing Direct3D performance, and is the successor to the popular 3DMark99 MAX. Although it is a synthetic benchmark, it uses the advanced MAX-FX 3D engine from Max Payne, which is representative of the latest in Direct3D performance and technology.

3DMark2001 Pro

3DMark2001 Pro from MadOnion.com is the next progression of the popular benchmark. It also uses the MAX-FX engine and heavily

emphasises DirectX 8.0 functions, including programmable shaders. The results are not comparable with results from 3DMark2000 Pro.

Video2000

Video2000 is another MadOnion.com product designed to test video card performance. It doesn't measure 3D performance, but instead focuses on visual quality and video decoding performance.

Quake 3: Arena AtomicMPC Demo

Quake 3: Arena (Q3A), from id Software, is the very popular first person shooter representing the latest in OpenGL gaming technology. Q3A has a built-in benchmarking utility and built-in demos that can test graphics card performance. These demos are fairly simplistic, and are not representative of the worst conditions that the game can offer to a graphics card. So we developed our own AtomicMPC Demo that pushes the hardware as far as possible.

Other benchmarks

Sometimes we need to break down the tests into more specific areas, such as hard disk performance, or a particular facet of 3D like T&L or SSE. For these specific purposes we can draw on a vast number of applications, games and dedicated benchmarks such as CD Speed 99, DisplayMate, Evolve, MDK2, Adaptec ThreadMark, Aquamark or Serious Sam. Whenever we use one of these special benchmarks we will outline the nature of the tests, the testing procedures and any settings we use. □

atomic testbench specs

There are two testbenches in the Labs: one for running AMD processors and one for Intel processors. Both run Windows Me, DirectX 8.0a or DirectX 8.0, Live!Ware 3.0 for Windows Me, and Detonator XP 21.83 drivers.

- AMD Athlon XP 1800+ system – ASUS A7V133 motherboard (CPU supplied by Legend Performance Tech, (08) 8401 9888)
- Intel Pentium III 1GHz system – ASUS CUSL2 motherboard (Both systems supplied by CASSA, www.cassa.com.au)
- Intel Pentium 4 system – ABIT TH7-RAID motherboard (Supplied by ABIT, www.abit.com.tw)

Common components

- Transcend 128MB PC133 CL2 SDRAM (Supplied by CASSA)
- Transcend 128MB PC2100 DDR RAM (Supplied by CASSA)
- Samsung 256MB PC800 RDRAM (Supplied by CASSA)
- 20GB Ultra DMA/100 7,200rpm hard disk drive
- Hercules Prophet II GTS 32MB (Supplied by GigaBite, www.hercules.com)
- Sound Blaster Live! Player (Supplied by Creative Labs Australia, www.creat.com)
- ASUS 12x DVD-ROM drive (Supplied by CASSA)

Benchmark settings

3DMark2000 Pro

- 1,024 x 768, 16-bit colour, 16-bit textures, 16-bit Z-buffer, triple frame buffer
- 1,024 x 768, 32-bit colour, 32-bit textures, 24-bit Z-buffer, triple frame buffer
- 1,600 x 1,200, 16-bit colour, 16-bit textures, 16-bit Z-buffer, triple frame buffer
- 1,600 x 1,200, 32-bit colour, 32-bit textures, 24-bit Z-buffer, triple frame buffer

Quake 3: Arena AtomicMPC Demo

All tests use Quake 3 1.27g

- CPU: 320 x 240, maximum geometry detail, minimum graphics settings, high sound quality
- Graphics cards: 640 x 480, normal quality graphics settings, high sound quality
- 1,024 x 768, maximum graphics settings, high sound quality
- 1,600 x 1,200, maximum graphics settings, high sound quality

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RADEON

SERIES

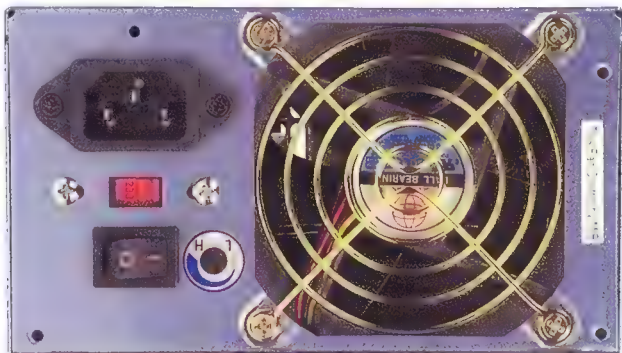
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- Dual Independent Display Support
- DVI-ready for the digital flat panel revolution
- Supports up to 230MHz DDR memory



Enermax EG465P-VE



Remember the good ol' days? When cases all came with in-built power supplies and no-one thought of them as 'components'. Since then there has been an explosion in the popularity of cases – such as those from Lian Li, which are not shipped with power supplies (mainly because including a PSU turns the case into an electrical device and this means it needs to comply with emission regulations) – as well as a burst in case modding, which often needs more power to cope with Neons, case fans and all those other power suckers that we strap into our cases.

What we actually want from a PSU is hard to nail down. Sure, good, clean power is a must, as is a high wattage. The Enermax EG465P-VE gives you a massive 431W of power to play with, but also has some extra features that act to make

your case cooler and keep it quiet.

The PSU features two fans, one of which plugs into a motherboard header for temperature monitoring and features a speed control dial. Dual venting on the PSU is definitely a bonus, with the fans not only cooling the PSU but also sucking hot air out from its collection point at the top of the case. The fans are quiet, with the only discernable noise that 'oh, so sweet' rushing of air out the back of your case.

When it comes to power supplies, length does matter, and the EG465P-VE stands out with long power cords. The ATX power cord is 68cm long, which beats the cord on our reference Topower PSUs by a good 23cm. All the other cords are of a similar length, so for anyone with a big case or in need of extra length for that kick arse case mod will love this feature.

The only potential issue with the EG465P-VE is found with a lot of dual fan PSUs; namely, some cases have upside down mounting points that can lead to your second fan sucking noisily at the top of your case, rendering it useless. As long as you check for this, then this is an incredibly viable option to power your next system.

SPECIFICATIONS

431W PSU, dual fans, eight Molex connectors, Pentium 4 compatible, adjustable fan speeds.

Web site: Enermax www.enermax.com.tw

Supplier: PC Case Gear www.pccasegear.com.au

Phone: PC Case Gear (03) 9572 3444 **Price:** \$220



Acer CRW 2410A



The proliferation of CD reviews in this month's Atomic tempted us to subtitle the entire issue 'The expensive drink coaster maker edition'. It seems as if every man and his dog has released a 24x burner over the last couple of months, so we thought it was time to have a look at what some of these drives are capable of and if they differ at all in performance. Acer's CRW 2410A is one of the newfangled 24x write, 10x rewrite, 40x read, warp factor 9 drives to get the Atomic benchmark beating this month.

Like all drives that promise a zippy 24x writing speed, this drive only manages such speeds when writing to the outer edges of the CD, which happens about as frequently as a Satanist attends Christmas Eve Mass. Using CD Speed 99 (www.cdspd2000.com), we verified that for the inner part of the disk, where data writing commences, the burner writes at 12x. Not quite the lofty speed promised on the box, though it did manage an average speed of 20x, with the maximum speed of

24x reached on the outer edge. Similarly, the average read speed was 30x instead of the promised 40x. Of course, you'll need to use high-speed media to guarantee a write that leaves you with more than a shiny new drink coaster. Ripping a 74 minute audio CD took a lengthy four minutes and 21 seconds, which is quite slow when compared to some of the other drives we've reviewed.

The drive uses PCAV (Partial Constant Angular Velocity), which helps to make the drive write at a faster speed across the whole disk. Seamless Link buffer under run protection is also included, which helps to make sure you don't waste four CDs every time you want to burn a disk.

The drive ships with a full version of Nero, as well as a couple of blank CDs. Not quite the 'CD production line in a box' that some other packages resemble, but the lack of fluff helps to keep the price at a low \$459. In all, the CRW 2410A is a quality product at a reasonable price, but is let down by its audio ripping speeds.

SPECIFICATIONS

24x write, 10x rewrite, 40x read, Seamless Link buffer under run protection

Web site: Acer www.acer.com

Supplier: Acer www.acer.com/au

Phone: Acer (02) 8762 3000 **Price:** \$459



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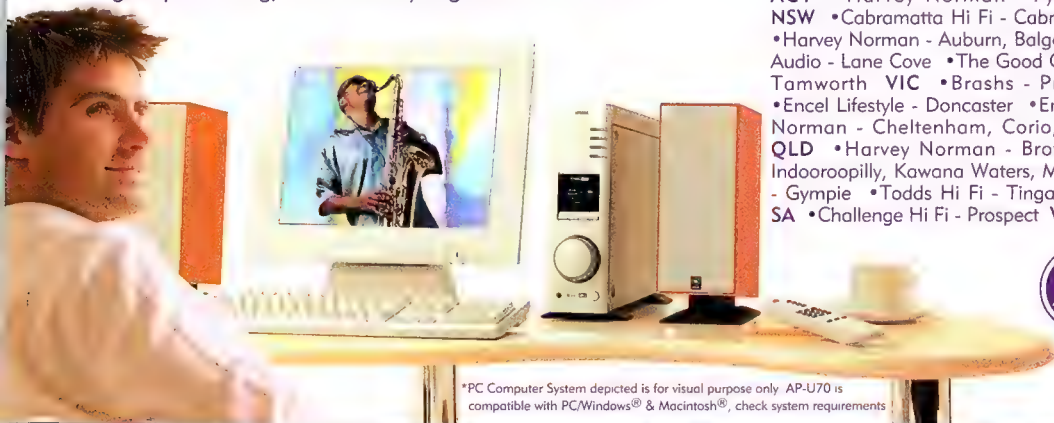
The AP-U70's versatility is amazing: set up your own private home theatre utilising the same digital technology as Yamaha's best home theatre amplifiers, with Cinema DSP Digital processing, Virtual Dolby Digital and DTS sound.

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The AP-U70 also has great connectivity for external sources such as DVD, CD, CDR, cassette, MP3 or MD player, and is available with Yamaha's compatibly designed NS-U30 speakers.

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The AP-U70 is now available at the following participating stores:
ACT •Harvey Norman - Fyshwick •Miranda Hi Fi - Canberra
NSW •Cabramatta Hi Fi - Cabramatta •Haberechts Retravisson - Albury
•Harvey Norman - Auburn, Balgowlah, Liverpool, Moore Park •Len Wallis
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•Encel Lifestyle - Doncaster •Encel Stereo - Richmond, Niddrie •Harvey
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- Gympie •Todds Hi Fi - Tingalpa, Virginia •Toombul Music -Toombul
SA •Challenge Hi Fi - Prospect WA •Kalgoorlie Audio World - Kalgoorlie.



YAMAHA

www.yamaha.co.jp

*PC Computer System depicted is for visual purpose only. AP-U70 is compatible with PC/Windows® & Macintosh®, check system requirements



Enermax Variable Fans



If you're like most of the Atomic staff, your PC case is no doubt bristling with more fans than a wind farm. The benefits of having a constant breeze circulating through your case, feeding cool air to your heatsinks and devices, include a more stable PC as well as the possibility of a higher

overclock. The noise level of one case fan is almost unnoticeable, but combine four or five of these suckers and your PC starts to sound like a Harrier Jump Jet just before take off. Addressing this problem of noise pollution are Enermax's new RPM adjustable fans.

The first thing you'll notice about these fans are their colour, a shade of purple that would make Barney proud. The fan blades are also rather fashionable – a frosted translucent colour. Though these colours might clash with certain case paint schemes, it's a nice change from the regulation black of every other fan on the market.

The twin ball bearing assembly ensures a lengthy life span for these fans, and noise levels surprisingly remain tolerable even when cranked up to the highest speed of 3,000rpm. Three pin connectors allow for rpm monitoring via your motherboard, though this is now standard for PC fans.

What sets these fans above and beyond the rest of the field is the manual speed adjustment. A small rotary dial is attached to each fan, which adjusts the speed from a whisper quiet 1,000rpm all the way up to a buzzy 3,000rpm.

We found that up to speeds of around 2,000rpm the fan was inaudible above the usual environmental hum and buzz of a PC. And this is more than fast enough to get the air circulating through a case, ridding the system of the warm ambient air thatn can play havoc with your hardware.

The only drawback these fans have is their price, which is around twice that of a plain Jane case fan. However, fans are so cheap anyway that a doubling of price is basically insignificant. These fans are definitely recommended for keeping your case cool while keeping your sanity intact, as long as their bright shade of purple doesn't look out of place in your box.

SPECIFICATIONS

Variable speed fan – 1,000rpm to 3,000rpm

Web site: Enermax www.enermax.com.tw

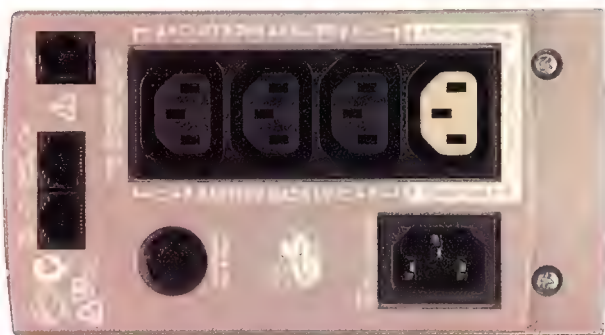
Supplier: PC Case Gear www.pccasegear.com

Phone: PC Case Gear (03) 9572 3444

Price: 80mm \$22; 120mm \$37.50



APC UPS



When it comes to UPSs, APC devices are the benchmark that all other UPSs aspire to. The APC Battery Backup 350VA is a prime example of why APC is acclaimed within the Atomic labs for producing quality products at an amazingly affordable price.

At only \$130, this UPS is one of the cheapest units available. Don't let that deter you, as this beast has as many features as the rest of the pack, combined with outstanding battery performance.

The number of ports at the rear of this unit is identical to the Belkin unit also reviewed this month. There are three power points that supply both filtered power as well as battery backup, alongside a single point that only filters the power. There are

also two ports for RJ45 connectors, which will protect all of your networking gear from power spikes.

A USB or serial interface is also included to attach the unit to your PC and so enable the supplied software to shut your PC down when the battery power gets critically low. The software installed perfectly, and shut down the PC with plenty of warning after the batteries kicked in.

A \$100,000 connected equipment warranty is a pretty good sign that the line and power filters for this unit can be relied upon. If not, APC wouldn't be in business for long.

To test the unit we attached a Duron 600 system with a 17in monitor. This system was kept busy with the SiSoft Sandra CPU burn-in mode at the same time as the hard drive was defragged. To our amazement, this UPS managed to last for 13 minutes, 11 seconds before the battery was drained. Compare this to the seven or so minutes of the Belkin unit, which costs \$80 dollars more, and you can see why we were impressed.

If you're after a quality UPS at an amazingly affordable price, you simply can't go past this unit.

SPECIFICATIONS

ADSL/network/phone protection, four power sockets, two year warranty, \$100,000 connected equipment warranty

Web site: APC www.apcc.com/au

Supplier: APC www.apcc.com/au

Phone: APC (02) 9955 9366 **Price:** \$221





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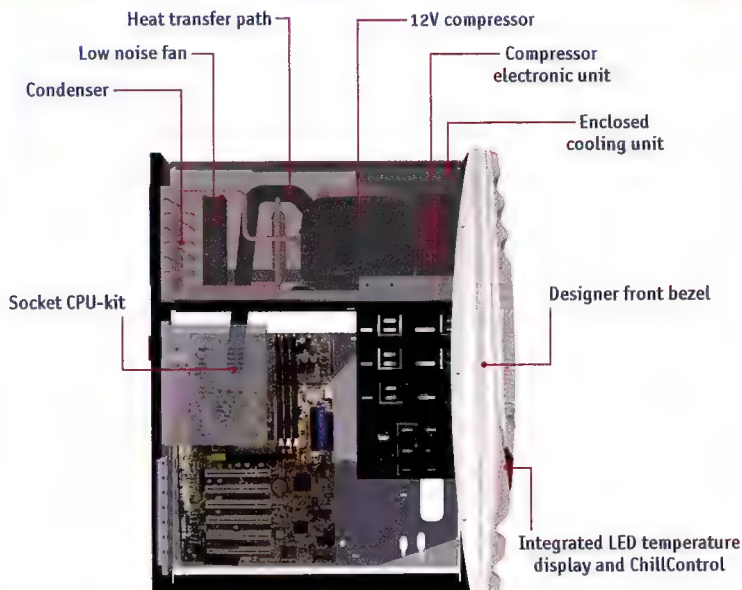
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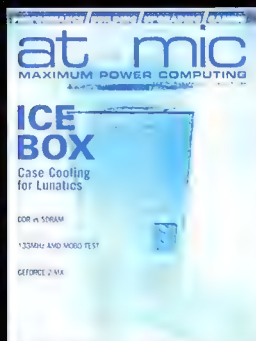
Baby got back?



Atomic 01
P4 vs. Athlon DDR
Duron overlocking
Voice comms
Historic 1st Atomic



Atomic 02
Graphics wars
Intel overlocking
Gamecube
SFX



Atomic 03
Case cooling
DDR vs. SDRAM
133MHz FSB AMD
Budget graphics cards



Atomic 04
GeForce3
BIOS tweaking
DVD vs VCD vs. DIVX
Dual CPU systems



Atomic 05
Pentium 4 validation
Broadband shootout
IRC skillz
Athlon Axia



Atomic 06
Water cooling
Win XP
Kyro II
Napster clones



Atomic 07
GeForce3 roundup
Hacker proofing
3dfx history
Dual Athlon mobos



Atomic 08
HSF roundup
Bitboys scoop
Mousepads benchtested
GBA destruction



Atomic 09
Audio CPU suckage
Pentium 4 gets good
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Let's talk about your back side

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Oh, so it's 'need', now, is it? You NEED Atomic? Yes, yes indeed you DO need Atomic.

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Toshiba e570



PDA's come in two form factors: an over-sized mobile phone or a stumpy little notebook. Historically, support for both types was limited; Microsoft found it difficult to garner support for its portable Windows CE, while many users relied on their mobile phones for the relatively simple personal information management tasks offered by the PalmOS. Things have changed significantly with Microsoft's PocketPC, which offers seamless integration with a desktop PC, while making users feel comfortable in its familiar Windows environment.

Toshiba's entrance into the realm of PDA's comes in the form of the new e570, which offers a host of features and a raging beast of a processor. It runs the 206MHz Intel StrongARM SA-1100 CPU, with a huge (for a PDA) 64MB RAM and 32MB

ROM, compared to typical PalmOS devices running less than or equal to 33MHz supplied by Motorola's DragonBall range, with an average 8MB RAM. Though this is more a testament to the requirements of the individual operating system, the e570 still felt smooth and responsive with little lag time when switching between applications.

Speed and hardware potential is only one part of the PDA, with some users looking at the number and type of expansion options provided. The e570 has all this covered – more so than most of its competitors out there with CompactFlash Type I and II, SD/MMC and infra-red.

While PDA's aren't typically covered in Atomic, the e570 definitely deserves a mention. For starters, it is one of the most attractive PDA's around, largely due to the excellent display quality. It houses the most beastly hardware we've seen in this form factor and, combined with the competitive price, you have an excellent piece of hardware that actually makes you feel like spending over \$1,200 for a contact database.

SPECIFICATIONS

Intel StrongARM 206MHz, 32MB ROM, 64MB RAM, 64,000 colour TFT, 240 x 320 resolution, PocketPC 2002

Web site: Toshiba www.isd.toshiba.com.au

Supplier: Toshiba www.isd.toshiba.com.au

Phone: Toshiba 1800 021100 Price: \$1,249



Belkin 500VA UPS



One of the fundamental laws of computing is that when you're working on a crucial document that you haven't saved for several hours, your computer will absolutely, positively crash. One of the leading causes of lost data is the loss of power to the PC, or a fluctuating supply of 'dirty' power to the PC. Which is why we have UPS's; these function as an emergency power supply when the power fails, and they have a power filter function to ensure that the power supplied is clean and stable. The Belkin 500VA UPS is one such unit that promises to keep your PC up and running even when the lights go out.

Belkin is obviously confident of this unit's ability to protect your PC from power surges, as it ships with a \$50,000 connected equipment warranty. (Talk about putting your money where your mouth is.) So you can be sure that this UPS will handle even the most extreme power surges. Three diagnostic LEDs adorn the front of the unit, and they let the user know if the batteries are being used, if the battery power is low, if the battery is faulty, if the unit is being overloaded or if there is a

fault with the unit. There are four power sockets on the rear of the unit, three of which provide battery backup and surge protection, while the fourth simply provides surge protection. There are also two ports to provide surge protection for RJ11 and RJ45 connections; that is, protection for computers that are using a cable, ADSL or dialup modem, as well as PCs that are hooked up to a LAN.

To test the unit we hooked it up to a Duron 600 system with a 17in monitor drawing around 270W of power, which is actually over the specifications that this unit is rated for. We then started a hard disk defrag at the same time as looping SiSoft Sandra CPU burn in mode. It lasted for a total of seven minutes and six seconds, before shutting the PC down via the included software. This should be more than enough time to save that crucial document you are working on before the system shuts down.

At a recommended retail price of \$299, this UPS is reasonably priced. Unfortunately, when compared to the APC UPS in this month's edition, the Belkin UPS comes a distant second place, offering less capacity at a higher price.

SPECIFICATIONS

228mm x 63mm x 177mm, ADSL/network/phone protection, 4 power sockets

Web site: Belkin www.belkin.com

Supplier: Belkin Australia www.belkin.com/anz

Phone: Belkin (02) 4325 4666 Price: \$299



Creative 24x10x40 CD-RW

Brad Webb discovers portability and power in a pretty package.



CD-R? Pfft! CD-RW is the chic way to burn these days, and what could be more chic than an external CD-RW in a soothing blue and silver schema?

Hyperbole aside, the Creative 24x10x40 CD-RW is a fairly good unit. Two interfaces are included with the drive: USB 1.1 and IEEE 1394 (actually, the drive uses Creative's SB 1394 interface, which is the same as IEEE 1394). With USB as standard on every new computer and the majority of (relatively) older boxes with some method of interfacing to USB, the Creative 24x10x40 CD-RW is guaranteed to work in almost any instance. Of course, at a maximum theoretical burn speed of 600KB/s using the USB interface, you won't exactly be blazing through your CD-R stash. This becomes overtly evident when you attempt to back up your huge MP3 collection only to find your shiny new 24x burner idling away at 3x write. Our tests reflected this USB limitation, with our 620MB data set burning in a whopping 25 minutes 38 seconds. This is a poor average of 2.8x write. Similarly, the 647MB set averaged a 2.9x write. However, the results are academic. The USB 1.1 interface was included to guarantee portability, not speed. To really push the drive, you need to use IEEE 1394.

This is where the real fun starts: firing up the drive on a 1394 interface to blaze through your backups at a (theoretical) maximum of 3600KB/s. During testing, the 1394 interface easily handled our 620MB data set in four minutes 32 seconds. The 647MB data set was faster still, flying through the burn in four minutes and five seconds. This equates to an average burn speed of 15.83x for the 620MB data set and 18.5x for the 647MB set, which are nowhere near the advertised 24x burn speed. Still, no burner on the market is capable of burning an entire CD-R at full 24x speed due to limitations inherent in CD-R and CD-RW technology. To burn an entire CD at 24x, the initial phases would have to be conducted with the disc spinning at around 9,000rpm. This is a bad thing. The faster you spin a disc, the more likely you will end up with a coaster due to vibration and jitter.

To get around this limitation, the Creative drive uses Partial Constant Angular Velocity (PCAV). Unlike competing Zone-Constant Linear Velocity (Z-CLV), where the burn speed is stepped up in three distinct phases depending on the write laser's position on the blank, a PCAV drive will spin the disc at a constant rpm of 5,500, and continue at said rpm until maximum

write speed is reached. At this point, the laser is around halfway across the disk and due to the wider circumference the laser covers over a given time period, more data is written. Thus, the drive can lower disc rpm after a certain point, without any drop in write speed.

Creative has included Nero Burning Rom and InCD, a packet-writing program that allows you to treat the drive as a normal HDD. This brings CD burning into the realm of 'point and drool', which is useful if your kid sister wants you to teach her how to 'burn them shiny things with Britney music on them'. There's also a copy of Creative Oozic player, which you may or may not find useful.

If you need an external CD-RW drive for portability reasons, the Creative drive is a good choice. The USB interface will ensure wide compatibility with most computers, so you can easily lug it to each and every LAN confident that it will work on most boxes. However, keep in mind that the drive does not come with a FireWire card. Unless you're willing to shell out for more hardware, or you're lucky enough to already possess an IEEE 1394 port on your existing hardware (you lucky Audigy owners), you won't be able to use this device at anywhere near its full potential.

How we tested

Our read tests were conducted using CD Speed 99 (www.cdspd2000.com). Unfortunately, CD Speed spat the dummy when asked to perform a write test on the Creative drive, a problem seen occasionally with external CD writers. After half a day of cursing, cussing and screaming at the drive, the program and several people who came to see what all the racket was, we decided to do it the old fashioned way. Two data sets were used, one was a single large file and the other consisted of several hundred small files. We timed how long each burn took and then worked out an average burn speed from the figures obtained.

SPECIFICATIONS

24x write, 10x rewrite, 40x read (IEEE 1394), 4x write, 4x rewrite, 6x read (USB 1.1), 2MB Buffer, BURN proof tech

Web site: Creative www.creative.com

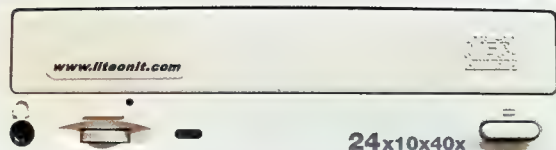
Supplier: Creative www.creative.com

Phone: Creative (02) 9666 6100 Price: \$699





LiteOn 24102B



It's rare that a piece of hardware comes about that truly redefines the field in which it is stationed. The 24102B is Taiwanese manufacturer LiteOn's latest CD-RW offering and manages to do just that, sporting 24x Write, 10 speed ReWrite and 40x Read capabilities. This alone is not what makes the drive so special, indeed, several drives now carry this exact rating. What separates this drive from the rest is its ability to burn using RAW-DAO-96.

RAW-DAO-96 is a burning mode that allows writing of all subchannel information including digital signatures, catalog numbers, CD text, gaps, indices, table of contents, CD+G, CD+Midi, and International Standard Recording Code data (basically a unique global identifier for tracks on sound or music video recordings). For Joe Lamer, this means you can back up working copies of almost every CD under the sun, including those with the notoriously difficult SafeDisc 2 protection. So far the only other readily attainable drive that can achieve this is the Plextor PX-W2410TA, coming in at almost double the price.

The fascia is dead plain, marked only by a sticker with

LiteOn's Web address and the drive speed, as well as the obligatory Compact Disc logo – a perfect canvas for modding freaks. Rather than the traditional two LED standard, LiteOn has gone for the single, which turns green when reading, red when writing and orange when waiting for data. The retail bundle came with a single CD featuring Nero Burning Rom 5.5.3.0, InCD 2.26, as well as PDF manuals and even MS-DOS drivers for those left in the stone age.

Performance wise the 24102B whips along at a blistering pace, with an impressive end speed of 40.58x and an average transfer rate of 30.77x in Nero CD Speed 99 (www.cdspd2000.com). As is common with Zone Constant Linear Velocity (Z-CLV) burners, it burns the first six minutes at 16x, jumps to 20x for the next ten minutes and then finally jumps to 24x. SMART-Burn, LiteOn's equivalent of Burn Proof, also performed admirably, managing to create an error free burn while playing Max Payne on the same system. Gotta love new technology.

The LiteOn 24102B is an absolute beast of a burner for an extremely low price. Highly recommended. □

SPECIFICATIONS

24x Write/10x ReWrite/40x Read, SMART-Burn, IDE interface.

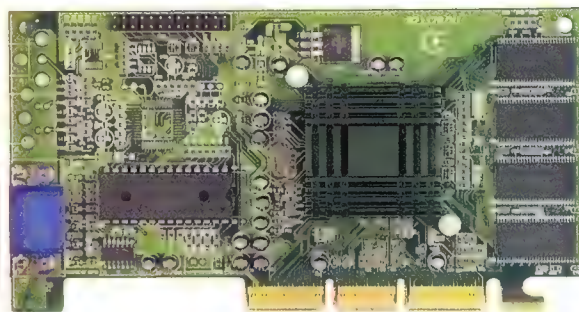
Web site: www.liteonit.com.tw

Supplier: www.cws.net.au

Phone: CWS (03) 5945 2000 Price: \$244



Jaton 3DForce G-32



A few months ago the news emerged that certain low-budget video cards had the ability to fry the new i845 based Pentium 4 motherboards. These cards were based upon the TNT2 Vanta chipset from NVIDIA and the SiS 315 chipset. The one major budget chipset that didn't fry motherboards was the Blade from our old mates Trident.

The Blade chipset comes in several implementations, based upon core and memory speeds. Jaton's 3DForce G-32 uses the

Blade T64, which runs at 166MHz and uses 32MB of 64-bit SDRAM running at 143MHz. This translates into fairly poor 3D gaming performance, managing only 17.4 frames per second at 800 x 600 high detail in Quake 3 and 784 3D marks in the 3DMark2001 Pro standard test.

But gaming is not what this card is designed for. It is designed as a good solid, desktop graphics accelerator, which can handle 3D games if it needs to. For example, on an Athlon XP 1800+ system the card gained a SYSmark rating of 164. The same testbench scored 167 when using a 32MB GeForce2 GTS. The chipset also includes hardware based MPEG2 motion compensation, which takes some of the load off the CPU when playing DVDs.

When the decent performance in desktop tasks is combined with the DVD assistance and low price, this card becomes a very viable option, especially for Pentium 4 owners who are currently without an integrated graphics chipset solution.

Solid and reliable, the Trident is value for desktop apps. □

SPECIFICATIONS

Trident Blade T64 chipset, 32MB SDRAM, 15-pin D-Sub connection

Web site: Jaton www.jaton.com

Supplier: Jaton www.jaton.com

Phone: Jaton (03) 9873-3999 Price: \$89



Coolermaster Thermal Paste

Bennett Ring gets his hands dirty with some cool goop – literally.



The reason we use thermal paste is simple – it fills the gap between a CPU and its accompanying heatsink, thus aiding the transferral of heat from the CPU to the heatsink. To the human eye the surfaces of a CPU and heatsink look pretty darn flat, but to the 10,000x zoomable eye of a T1000 liquid-metal Terminator, these surfaces are more akin to the Grand Canyon. This means that when pressed together there are lots of microscopic pockets of air trapped between the two surfaces. This is a very bad thing, because air is a crappy heat conductor and the heatsink can't 'soak' up the heat as well, so thermal paste is used to fill these air pockets.

The Coolermaster thermal paste we received arrived in two yummy flavours: High Performance and Premium. Each pack includes a small syringe filled with paste, as well as an application stencil and a plastic spreader card. Simply attach the template to the base of the heatsink, use the spreader card to fill in the stencil's gap with paste and Bob's your uncle.

Due to the new internal temperature diode within the Athlon XP, temperature monitoring can now be conducted far more accurately than with the old in-socket temperature probes that the original Athlon had to make do with. We installed an Athlon XP 1800+ into an MSI K7T 266 Pro2 RU motherboard, safe in the knowledge our temperature measurements would be as accurate as you can get without shrinking an Atomic writer down to a height of ten nanometers and throwing him inside the CPU core armed with a rectal thermometer.

We also tested with Arctic Silver II, el cheapo generic thermal paste, and no paste so we could compare the results with the Coolermaster paste. Each was applied to the freshly cleaned WBK-38, and then left for 30 minutes while SiSoft Sandra 2001 CPU burn-in mode ran. Ambient temperature was a constant 22°C throughout all of the tests.

As the graphs show, there was absolutely no difference between any of the pastes, with all of them reaching a maximum temperature of 40°C. Without paste the temperature rose immediately by 6°C, so we knew the temperature diode was working. We couldn't believe this so we ran the tests again. And again recorded no difference. We then repeated the tests with a less powerful FOP-32, while the CPU Vcore was cranked up to 1.85V, in a bid to increase the temps in the hopes of seeing a little variance at the higher temperature. Surprise, surprise, absolutely no difference! Every paste reached a temperature of 44°C, with the pasteless CPU hitting a toasty 57°C. We ran the tests one more time just to check the validity of the first round, and once again recorded identical temperatures.

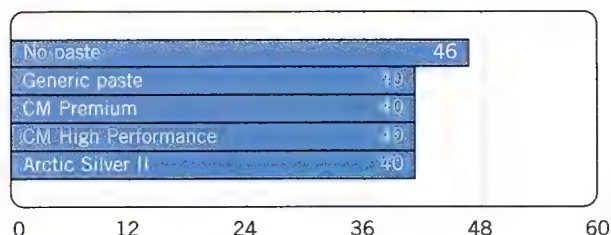
After years of hearing 'this paste is better than the others because it has a higher conductivity rating and it's a pretty silver colour', the results blew us away. As a result we've come to the conclusion that thermal paste plays a very minimal role when it comes to CPU cooling these days. As long as the microscopic

gaps are filled, they all seem to perform identically.

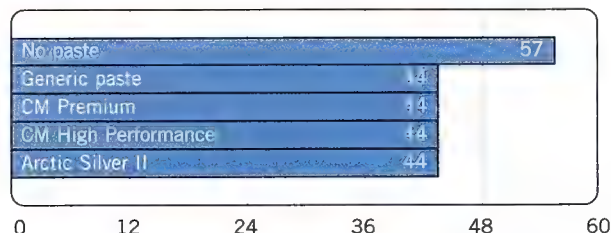
We recommend the High Performance paste over the much more expensive Premium paste as it is much simpler to apply. This is because the High Performance paste has the usual toothpaste consistency, making it easy to apply, while the Premium paste has the consistency of one of those turds that leave a sticky skid mark on the toilet bowl, making it very difficult to spread evenly over the CPU and/or HSF.

If it wasn't for the additional application kit, we'd tell you to buy the cheapest thermal paste you can get your hands on. But due to these extras, the Coolermaster High Performance paste gets the thumbs up for being the simplest to apply thermal paste available.

WBK38 @ 1.75V Vcore, 22°C ambient



FOP-32 @ 1.85V Vcore, 22°C ambient



SPECIFICATIONS

High Performance Thermal Paste

Thermal conductivity = 4.18 W/mK

Web site: Coolermaster www.coolermaster.com

Supplier: Protac www.protac.com.au

Phone: Protac (02) 8748 8888 Price: \$7

SPECIFICATIONS

Premium Thermal Paste

Thermal conductivity = 6.8 W/mK

Web site: Coolermaster www.coolermaster.com

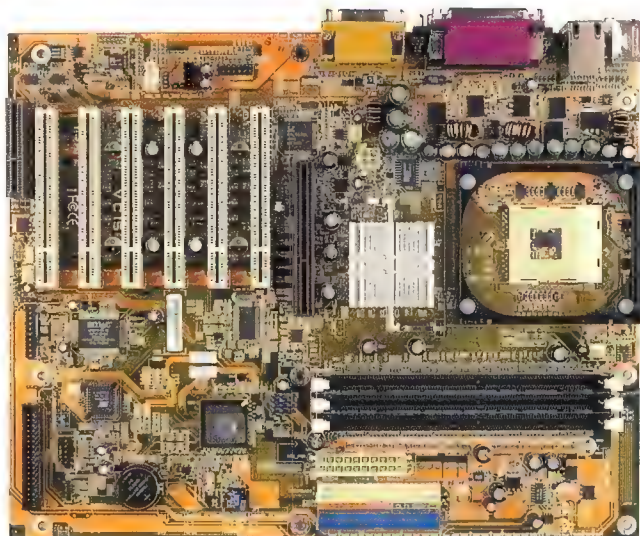
Supplier: Protac www.protac.com.au

Phone: Protac (02) 8748 8888 Price: \$22



FIC VC15

John Gillooly witnesses the birth of Intel's DDR lovechild.



It always happens this way. After spending almost a year pining for a non-RDRAM Pentium 4 performance solution, we cop not one but three of the suckers in the space of a few months. The latest member of the Pentium 4 chipset club comes from Intel itself and is a new iteration of the somewhat dissappointing i845 SDRAM chipset.

The problem with the SDRAM powered i845 was that it simply did not provide enough bandwidth for the Pentium 4 and its quad pumped 100MHz FSB (400MHz effective). The processor was designed to work hand in hand with RDRAM, which can deliver this bandwidth. The compromise solution has always appeared to be DDR RAM, and the previously released VIA P4X266 and SiS645 chipsets have shown that DDR delivers a comparable level of performance to RDRAM, but at a much more reasonable price.

The presence of these chipsets in the marketplace has kicked along the launch of the DDR-enabled version of the i845 (named the i845 B-Step). Actually, to be precise, the i845 has always supported DDR, it is just that licensing meant no-one could make a DDR board until Intel gave the say so.

So the Intel DDR solution is here, and the first board to hit the Atomic Labs is the VC15 from FIC. This board sports three DDR slots (supporting up to 2GB of DDR RAM), six PCI slots, integrated Ethernet via an onboard Realtek chip and integrated audio. Like other i845 boards, the AGP slot only supports 1.5volt AGP 4x video cards. This is important because some cheaper cards like the ubiquitous TNT2 Vanta cards and the newer SiS315 cards have a high chance of frying your brand new motherboard.

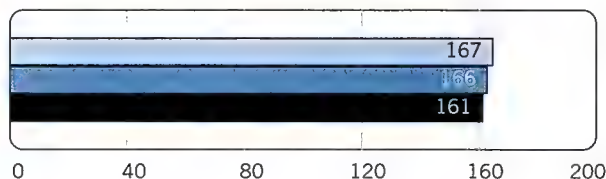
We tested the FIC VC15 using a 2GHz Pentium 4 with 256MB of PC2100 DDR RAM (DDR266) under Windows Me, and have compared it to current Pentium 4 DDR speed champion MSI 645-Ultra, which uses PC2700 DDR RAM (DDR333), and an Intel 850 reference board using 256MB of PC800 RDRAM.

'DDR delivers a comparable level of performance to RDRAM, but at a much more reasonable price'

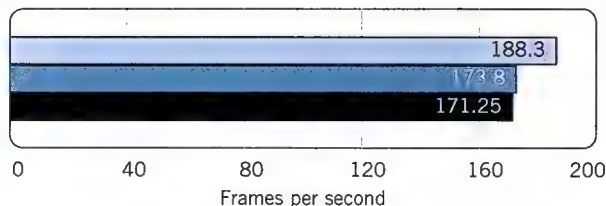
The tests show that the i845 is a surprisingly powerful performance solution, especially given that this is Intel's first foray into DDR. In fact, Intel had been concerned that the DDR specifications were too loose and so made a concerted effort to get it right the first time, something that has obviously paid off for them. In SYSmark2001 the VC15 scraped ahead of the other boards by the narrowest of margins; however, in the Quake 3 CPU tests the VC15 takes a clear lead, 8% faster than the MSI 645 Ultra.

The boost in performance shows that there is still room for DDR to be used more efficiently. As we have recently seen in Athlon motherboards, a simple thing like an upgraded memory controller can deliver tangible increases in performance. As we wait for the next salvo in the Pentium 4 DDR battle, the clear leader is now the i845 B-Step and the FIC VC15 is a good, cheap way to get into it. □

SYSmark2001: SYSmark rating



Quake 3: Arena (CPU)



- FIC VC15
- MSI 645-Ultra
- i850 reference board

SPECIFICATIONS

i845 B-Step, three DDR slots, six PCI slots, onboard LAN and audio

Web site: FIC www.fic.com.tw

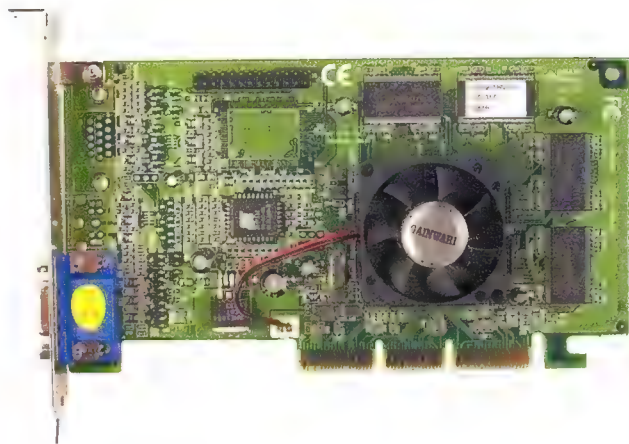
Supplier: National Computers

www.nationalcomputers.com.au



Gainward SiS 315

Budget video cards get interesting and John Gillooly is interested.



It is unfortunate that the thing that catapulted SiS's 315 chipset into the mainstream was a warning that it was one of the cards that can fry i850 and i845 motherboards. This is somewhat of a shame given that SiS is a star on the rise, and has delivered a budget chipset that actually holds its own.

Because the graphics card industry is nothing without pigeonholing, the SiS 315 can be described as a fifth generation MX class chipset. What this actually means is, SiS has delivered a 256-bit 3D graphics chipset with a hardwired Hardware Transform and Lighting engine (but don't call it a GPU, that is trademarked by another, unnamed, graphics company). The chipset supports a 128-bit SDR/DDR data bus and supports either 32 or 64MB of video RAM (SiS actually states that the chipset supports up to 128MB of video RAM, but don't expect

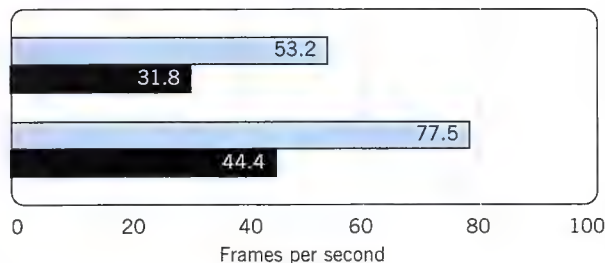
to see this in action), and also includes a hardware MPEG 2/1 video decoder.

Gainward's card uses 32MB of SDRAM, which will impact performance when compared to 64MB of DDR. To test this we took a 1.2GHz Thunderbird Athlon and used both the Gainward SiS 315 card and a 64MB GeForce2 MX-400. We tested using 3DMark2000 Pro, Quake 3: Arena and SYSmark2001.

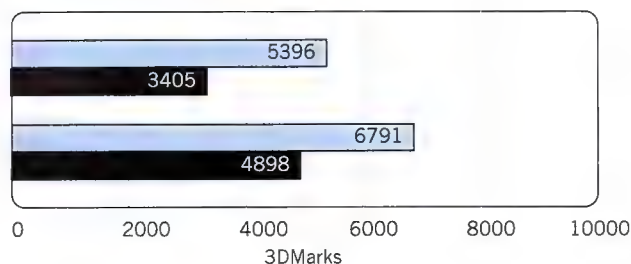
Across the board, the SiS 315 was slower than the MX card, but still delivered surprisingly playable frame rates. In SYSmark2001 the difference was negligible, again proving that if you are only after a card for desktop tasks and the occasional game, then the low budget range is very viable, and the Gainward SiS 315 is a very capable piece of hardware.

The only downside to the card is its problems with i850 and i845 motherboards. Given the lack of Pentium 4 boards with onboard video (SiS has a variant of the 645 chipset with video, but it is still not in wide use), the issues with the cards miss the target market. If you want a reasonably priced card for a non-Pentium 4 system, though, this is a tasty option. □

Quake 3: Arena AtomicMPC Demo



3DMark2000 Pro



GeForce2 MX-400

Gainward SiS 315

SPECIFICATIONS

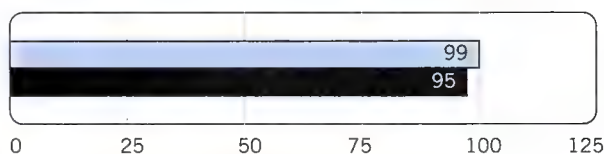
SiS 315 graphics chipset, 32MB 128-bit SDRAM, Hardware MPEG 1/2 decoding

Web site: www.gainward.com.tw

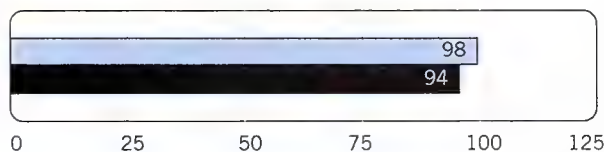
Supplier: Hallmark www.hallmark.com.au

Phone: Hallmark (02) 9748 8811 Price: NA

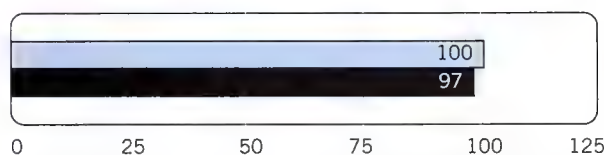
SYSmark2001: SYSmark Rating



SYSmark2001: Office Productivity



SYSmark2001: Internet Content Creation





GAMES



R

Games can be violent. They are also not just for kids. John Gillooly wants to see an R rating, and this is why...



It was a very non-Alanis Morissette type of irony the day it was announced that Grand Theft Auto 3 (GTA3) was to be pulled from shelves as it was also the day Judas Priest played in Sydney. For those who aren't up on the whole '80s metal scene (there must be one of you out there), good ol' Judas Priest was one of the original targets of music censorship groups, and had also been entangled in legal battles over whether its music was responsible for a suicide pact between two American teenagers who were allegedly influenced by back-masked messages saying 'do it' on one of its albums. Judas Priest eventually won the court case, but the whole debacle stands as one of the landmark moments in the ongoing media debate about violence in entertainment.

The game industry is about to reach the point that the music industry reached in the '80s. The pulling of Grand Theft Auto 3 from the shelves on 5 December, and the subsequent refusal of classification, was clouded in several layers of confusion. Initially, it was seen as a knee-jerk reaction to articles that appeared in Sydney and Melbourne newspapers, which were a rehash of the age-old violence and gaming arguments, but also contained some rather sane comments by Victorian Premier Steve Bracks, who was actively pushing for the belated introduction of an R rating for games. In the end, the pulling of GTA3 was ascribed to confusion during the process of application for rating with the Office of Film and Literature Classification (OFLC).

The argument for an R rating keeps popping up again and again, usually in concert with the release of games like Carmageddon, Postal and now Grand Theft Auto 3. As games get more and more realistic there is a need to keep the games that adults want to play available, but stop 'em from corrupting the kids, a plan that most people agree on.

We are very much at a crossroads in gaming. The increase in realism that comes from modern day processing power, graphical grunt and audio hardware means we are seeing more than ever before games that offer a greater freedom of choice.

GTA3 has an amazing scope. A big success in gaming is creating a believable, persistent fully 3D city. Whereas games like Midtown Madness, Driver and Carmageddon have achieved this to some degree, GTA 3 takes it a step further and allows you to run around, catch trains, steal and drive a host of cars, pretend to be a taxi, and yes, mug people and demonstrate a whole range of anarchic and violent activity.

It is not a game for children, but on the other hand it is a game that demonstrates nothing worse than what is seen in some R-rated movies like *Natural Born Killers*, and nowhere near the level of intensity of Category 2 Restricted books like Brett Easton Ellis' *American Psycho*. The actual issue that needs to be addressed is the outdated notion that games are for kids.

Games are for kids. They are also for everyone else. One thing that is abundantly clear, to me at least, is that you can never really tell if someone is a gamer or not based upon first impressions. If we look at the simplest part of the equation, most of the kids that were kids when the games are for kids arguments first evolved are no longer kids. That is one of the great joys of life, we (most of us anyway) grow up, mature and become better able to cope with more mature concepts. It is called becoming an adult.

I want to be able to play the games I want to play. The introduction of an R rating for games is becoming a necessity, not just because of an increase in violent games. That is not what we are seeing. GTA3 is nowhere near the pathetically mindless kill fest of Postal, but it allows the gamer to have a huge degree of control over how they behave, and some people will choose to push the envelope.

This is where gaming is headed. How on Earth can you classify a massive multiplayer RPG, or a game like Black and White, in which the central focus of the gameplay is freedom of choice? Let's face it, these games aren't immediately violent, but they can be. It all depends upon how people choose to play the games. For example, how does some sort of user created phenomena like player killing fit into the current classification paradigm?

An R rating for games seems to be the next logical step. Unfortunately, the review period for game classification by the OFLC is over and the ultimate changes are now in the hands of Parliament. The introduction of an R rating should theoretically satisfy those on both sides of the argument. It takes some of the currently MA rated games out of the hands of kids and into the hands of adults where they belong, and should hopefully mean that games like GTA3 can make it back onto the shelves and into the hands of people who should be mature enough to play them.

O

Empire Earth

James Cottee is wondering just how complex can games get?



FAR LEFT: In reality, this view is used purely for 'oh-ah' value, and is somewhat useless for most gameplay.
LEFT: Yes, you do get to see attractive loin cloths, and pointy sticks.

This game is big. Really big. In founding Stainless Steel Studios, Rick Goodman set out to top his previous achievement in Age of Empires. Empire Earth is a far sweeping upgrade of the concept; it extends beyond the mere 'tweakery' of Age of Kings. From the Stone Age to the Nano Age, EE has it covered. Though this does stretch the game mechanics a bit thin, the AoE junky will find it worthy of attention.

As in AoE, the key to power is production, and the key to production is population. Teeming hordes of peasants are required to mine ore, hunt wild animals, till the soil and build everything. Capitol buildings, the heart of every city, can produce citizens, but perversely enough must be infused with them to grow more powerful. The same goes for settlements and town centres, the larval and pupal stages of your Capitols. On the side of sanity is a relatively tame list of specialised buildings. You only need to build the one airport to handle everything from biplanes to B2 bombers, even if there are a few upgrade buttons in between.

The standard game modes are skirmish, multiplayer, campaign and mission. The latter can be customised and user designed, an open invitation to the mod community to vent its expansionistic fantasies. The game designers certainly vented theirs in the four standalone campaigns, including Greece (ancient), England (medieval),

German (world wars) and Russia (cyberpunk). The accents that take you on these scripted journeys of self-discovery are dodgy, but sadly lack the absurdist edge of the Red Alert series of games.

The range of military units is kept within sane proportions, the only newcomers to our world being the 'cybers', battlemechs of the near future. You can also build 'leaders', real and made-up historical figures who can give your civ either tactical or strategic bonuses. They include Gilgamesh, Rommel and a carbon copy of Molly Millions.

The new game engine runs very smoothly, with everything represented in 3D on a rolling 3D landscape. The way textures blend together, particularly on the ground, looks very lush, bordering on organic. Less appealing are the textures on the in-game units, particularly human faces. In its favour is the support for hundreds of units to be on screen simultaneously, which is far more likely than trying to play EE like The Sims. It looks a lot better than Galactic Battlegrounds, that's for sure.

A much advertised feature of Empire Earth is how it attempts to cover the entire length of human history. This is achieved by organising civilisation advances into 14 broad epochs. To progress from one epoch to the next, your civ must pay a hefty fee. Weapons are unique to given time periods, but structures and

build mechanics are common to all. This is a good way to bring order to the staggering number of units available, but at the expense of credibility.

Of greater interest is the degree to which you can customise the game. In addition to the civs EE comes with, you can create any you fancy, real or imagined, choosing relative strengths from a huge list of bonus options. They range from basic productivity issues through to research, naval and air power, and even alpine troops can get beefed up.

Empire Earth is the advanced squad leader of real-time strategy games. Those who found Age of Kings to be too simplistic will rejoice in the orgy of options, and will in all likelihood require a cold shower after playing it. This isn't the next big thing in RTS; it's the last big thing, only bigger.

atomic
8/10

GAME DETAILS

FOR: New options, strong multiplayer, eye candy.

AGAINST: More of the same. A whole lot more, but it's still the same.

MINIMUM REQUIREMENTS: Pentium II 350MHz, 64MB RAM, 550MB HDD, 8MB video card

RECOMMENDED: Pentium III 500MHz, 128MB RAM, 1G HDD, 32MB video card

SOUND APIs: DirectSound

VIDEO APIs: Direct3D

DEVELOPER: Stainless Steel Studios
www.stainlesssteelstudios.com

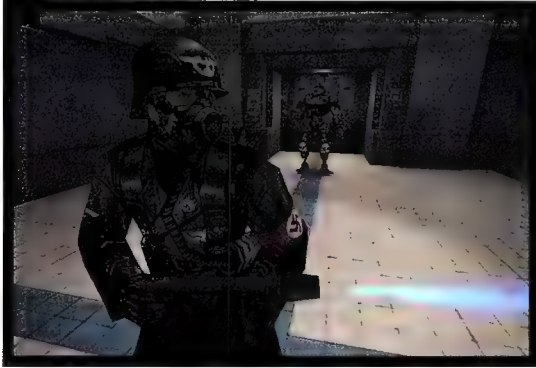
PUBLISHER: Sierra www.sierra.com

DISTRIBUTOR: Vivendi Universal www.vivendi.com

PHONE: Vivendi Universal (02) 9902 7722

Return to Castle Wolfenstein

Bennett Ring likes nothing better than to kick some Nazi arse.



❶ FAR LEFT
A blue flame to be proud of
LEFT: Bennett's got one of these outfits at home.

It's been a bumper end of the year for PC games. Never before have we seen so many killer titles released at the one time; but there had to be at least one stinker nestled in among the many greats. It turns out that the game emitting the most stench is perhaps the most highly anticipated game of the year – Return to Castle Wolfenstein.

Our first impressions of RTCW were excellent, especially in regards to the visuals. The Quake 3 engine is one of the most visually pleasing engines around, and RTCW has easily the most impressive character modelling and animation yet seen on the PC. The environments are almost as spoooge worthy, though the interior detail seems a little blocky when compared to other recent titles (cough AvP2 cough). The sound effects, unfortunately, don't live up to the high standards set by the visuals, and are at the most adequate.

You begin the game locked within the bowels of Castle Wolfenstein, but soon bust out *Great Escape* style. Before you can mix up a quick martini back at the officer's mess, you're whisked back to the castle to destroy a secret Nazi project dabbling in the supernatural. The creators claim the game can be played in one of two ways; there's the trusty 'annihilate everything that moves' modus operandi, or you can take your targets down Thief style, using nothing more than a silenced weapon or well

placed knife blow. But with the exception of one area, you'll find that the Rambo attitude is more than adequate to clear out most of the sections teeming with bad arsed Nazi dudes. The AI is quite competent, though it does rely more upon enemy placement than advanced algorithms.

Sounds like your standard first person shooter, doesn't it? And that's where RTCW's biggest problem lies – after a few hours of playing you just can't shake the feeling that you've done it all before. A hundred times or so. There isn't a single scene that feels fresh or original. The single player gameplay soon degrades into the depths of sheer boredom: approach a room, clear the room, approach next room, repeat ad infinitum. Thankfully, the multiplayer totally rocks – for a while at least. And that's only if you're on broadband; dialup users will find the archaic network code and its lack of client side prediction will leave them with a bad taste of lag in their mouths.

There are multiple classes of soldier that can be selected, as well as two main methods of multiplayer: capture multiple flags or complete an objective such as blowing up a gun or radar station. As a testament to the quality of the multiplayer experience, it really feels as if you are a WWII soldier in the middle of a raging battlefield, with bullets and shells zinging all around you.

There is one crucial flaw that stops the multiplayer from being

the greatest online FPS ever. It is limited to a meager six or seven maps, all of which are yanked straight from the single player game. Given that the objective-based games usually last around ten minutes a piece, you'll see every map within an hour. And then you'll play them again. And again. And once again. Boredom soon sets in. It's unbelievable that such a cool multiplayer mode could be crippled by a woeful lack of content, and this severely drags RTCW's final score down.

'If only' is a term that will be heard often about RTCW. Technically advanced, it's sadly let down by a lack of originality and variety. However, multiplayer holds incredible promise, provided the developers release new maps in the very near future. □

atomic
7.5/10

GAME DETAILS

□ **FOR:** Beautiful visuals, amazing multiplayer for broadband users.

□ **AGAINST:** Uninspired, unoriginal and unexciting, poor multiplayer for dialup users, lack of content.

MINIMUM REQUIREMENTS: 500MHz CPU, 128MB RAM, OpenGL compatible video card

RECOMMENDED: 800MHz CPU, 256MB RAM, GeForce256 or better

SOUND APIs: Direct Sound

VIDEO APIs: Direct3D

DEVELOPER: Nerve Software & Grey Matter Studios

www.nervesoftware.com www.gmistudios.com

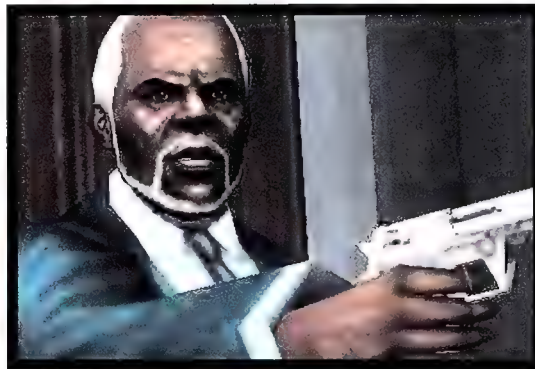
PUBLISHER: Activision www.activision.com

DISTRIBUTOR: Activision www.activision.com

PHONE: Activision (02) 9869 0955

007 Agent Under Fire

George Soropos is a stirrer and likes it shaken.



❶ FAR LEFT:
You can't have a
Bond game
without the
obligatory car
chase.
LEFT: The PS2
can now render
very high quality
stylish facial hair.

'The shadow of Rare's Goldeneye still hangs long and low on the horizon of the console gaming world...'

Listen up James. We just found out someone is planning to replace several key world leaders with clones. In fact you could call it an attack of the clones. But we won't, because we're British. One thing in our favour is that these chaps aren't too bright; the first world leader they cloned was John Howard. I want you to find these people James, close them down. And if you find any little Johnnys along the way make sure to exterminate them will you? There's a good chap.

The shadow of Rare's Goldeneye still hangs long and low on the horizon of the console gaming world, as is proved by yet another Bond inspired imitation in the form of EA's 007 Agent Under Fire. Agent puts you in the hot pants of 007 as he and his sexy CIA ally try and stop carbon copied zombies from taking over the world. Sorry James you missed the boat by about 200 years, but we appreciate the thought. Don't go changin'.

The game is split up into 12 different levels with several sections each and your main aim is to complete the objective for each one while trying to pull off as many 'Bond Moves' as possible for extra bonus points. Bond Moves are special setpieces

within each level, such as shooting the wire holding a crate above an enemy or jumping your car over a secret ramp.

We looked for other signature Bond moves such as the two-fingered bra removal, the single-handed bottom squeeze and the classic leap the pirahna pond in a tight pair of slacks, unfortunately to no avail.

It says something for the skill of Rare's programmers that no-one has been able to match Goldeneye, though many have tried. Agent Under Fire is just another wannabe. Its real failing lies in very poor level design and underdeveloped enemy AI. The player feels like a hamster in a treadmill the whole time, going through the motions as though in an uninspired B-Grade action movie, probably starring Ice-T.

Your enemies are slow to react, whether it's to take cover or raise the alarm. The AI in Dreamworks' Medal of Honour, a two year old PSOne title, was vastly superior to this! Another major complaint we have is with 007's value for money. Twelve levels isn't many and most gamers will be able to work through them in eight hours.

Sure you can keep perfecting your skills and get better medals

for your efforts, but what kind of loser spends their life doing the same thing over and over again for fictitious medals? If you're going to get a big lump of real gold around your neck and an invitation into the underpants of every available female in Australia, sure! But for a dorky Bond game? I don't think so.

The only impressive feature of Agent Under Fire is its graphics. EA has made good use of the PlayStation2's capabilities, and the story or cut scenes are a real highlight. However, the consistency of the game's frame rate leaves something to be desired. Sometimes the game speeds up like an old '20's Keystone Cop movie and other times it slows down to an annoying degree.

Unlike the PlayStation2 versions of Half-Life or Red Faction, Agent Under Fire supports up to four players at once in multiplayer. Most of the maps are well laid out and the game's slight variations on the standard death match theme give it some variety. If only the game had provided computer-controlled allies or opponents, as in Rare's Perfect Dark or Red Faction's two-player death match mode. ○

atomic
6.5/10

GAME DETAILS

○ **FOR:** Pretty pictures.

○ **AGAINST:** Too short, dull levels, poor AI.

MINIMUM REQUIREMENTS: PS2, Dual Shock2
RECOMMENDED: Tuxedo, Martini

DEVELOPER: MGM Interactive

PUBLISHER: Electronic Arts www.ea.com.au

DISTRIBUTOR: Electronic Arts www.ea.com.au

PHONE: Electronic Arts (03) 9882 1222

Myth III: The Wolf Age

Orc slaying is 3D joy. Des McNicholas checks out the latest way to slay.



❶ FAR LEFT:
Time for some
hacking and
slashing.
LEFT: The eerie
Myth atmosphere
is enhanced with
the new 3D
engine.

The Myth franchise has proven remarkably resilient and encouraged a significant level of online community support. Myth: The Fallen Lords emphasised strategy and tactics rather than resource management, and showed that fantasy themes were not confined to RPGs. Myth II built on that success, so players clearly have high expectations of Mumbo Jumbo's prequel.

Myth III is set approximately 1,000 years before its predecessors, chronicling the life and times of Connacht the Barbarian and his struggle against the dread Myrkridia. The game, supported by a comprehensive manual and some fairly average training, is based around a 25 mission campaign and multiplay via LAN or GameSpy. Veterans will be disappointed with the lack of any real multiplayer improvements, though it's likely that a map editor will be released in the near future to supplement the five multiplay maps included with the game. The missions are fairly challenging at all difficulty levels, incorporating a wide range of objectives and environments, and the briefings set a suitably eerie tone.

Players are presented with a force of various unit types at the commencement of each mission, with which they must see things through to the objective. Most units from the earlier games are included, supplemented by a dozen or so new variants to expand the skills of the existing

forces. The Armies of the Light boast such diverse characters as Llancarfan Archers, Scholomance Warlocks, Gower Clansmen and Dwarven Axe Warriors, while the unexpectedly named Armies of the Dark include Thrall, Stygian Knights, Myrkridian Pack-Mages and Giant Spiders. Units are modelled very well at all zoom levels, and the AI does a good job of assigning unique characteristics to them during battle. The balance of capabilities is also about right, giving players numerous and varied options.

Myth III's solid interface will be very familiar to fans of the series, as Mumbo Jumbo has sensibly decided to change almost nothing. Players will find the control of their forces relatively straightforward, utilising grouping arrangements that permit coordinated tactics and an overhead map to keep track of enemy movements. Ten unit formations are available via onscreen buttons or shortcut keys, simple waypoints can be set for movement and patrols, and special commands are available for collecting items, exercising special abilities and using objects. Some engagements can see hundreds of units on screen at any one time, and it all works well in the thick of battle. Speed controls are available to skip past the boring bits or slow tricky moments down, and the onscreen display is wholly configurable.

Mumbo Jumbo has done an excellent job with the 3D

environment, resulting in the best visuals of the series. Although the maps tend to channel movement a little, plenty of chances arise to make good use of ground, and players can get very close to the action. Weapon and special effects are well handled, particularly those of magical origin, and victims on the receiving end tend to implode, explode or fall over with the right degree of blood and gore. Despite a first-rate musical score, overall the game is OK rather than great, with the atmosphere marred in particular by the inappropriate tone of the tutorial and some unconvincing cheering at the end of each mission.

Myth III: The Wolf Age has an excellent single player campaign and a slightly flawed multiplayer experience. As the patch was due out at the time of writing, both aspects should now be great! □

atomic

8/10

GAME DETAILS

□ **FOR:** Excellent single player campaign, great 3D environment, and a well presented story.

□ **AGAINST:** Released with some multiplayer bugs (and no TCP/IP support); complex camera system.

MINIMUM REQUIREMENTS: Pentium II 400MHz, 96MB RAM, 250MB HDD, 16MB OpenGL compatible video card

RECOMMENDED: Pentium III 500MHz, 256MB RAM, 500MB HDD, 32MB video card

SOUND APIs: Direct Sound

VIDEO APIs: Direct3D

DEVELOPER: Mumbo Jumbo www.mumbojumbo.com

PUBLISHER: Take2 Interactive www.take2.com.au

DISTRIBUTOR: Take2 Interactive www.take2.com.au

PHONE: Take2 Interactive (02) 9482 3455

THE IT DIRECTORY

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Go to www.atomicmpc.com.au/dealers.asp?mode=1 to find the details of the following resellers, manufacturers and distributors, plus many more. The site lists the Web address, company address, phone, email and fax.

Our Web site will help you to find that elusive product; the ideal reseller, manufacturer or distributor of a particular brand; or simply a product type.

If you know what you are looking for, you can search for the most convenient place to buy it or simply research the options available to you. It's up to you how tight you set the criteria: you can do an advanced search and cross-reference by product, postcode, brand and so on. So quick and simple you'll wonder how you ever did without it!

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- Australian Network Solutions
- Autodesk
- AV Computers
- Below Zero
- Best Byte
- Bevdan Business Services
- Bits & Bytes
- BITS Computer
- Graphics
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- Centercom Computers
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- Complete Peripheral Services
- CompuEdge Pty Limited
- Computer Cyber Shop
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- Cool PC
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- Canberra
- CR Computers
- Creative
- Creative Zone
- Crossys Computers & Electronics
- CW Supplies
- Cyberdec Australia
- Cybertech Consulting
- Cybus Computers
- Cydex Computers
- D Link Australia
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- DNAML
- Dot Systems
- Duncan Computer Services
- EBM Computers
- Electronic Product Warehouse
- Emagen
- EPSON
- EYO Technologies
- FNQ Computers
- Focal Point Computing
- Forte Computers
- Franklin Electronic Publishers (Aust.) P/L
- Fuji / Hanimex
- Fuji Xerox Australia
- Games Warehouse
- Gateway
- GCC Technology
- Gigaworld Computer Systems
- Go-Xtreme Tek
- Griffier Enterprises
- Guillemot
- Hallmark Computer International
- Hewlett-Packard
- Hitachi Australia
- Hollywood 7 Computers
- HP Paradise
- Impact Systems Technology
- IMSI (Australia)
- In Learning
- Ingram Micro
- INKme
- Inktec Australia
- Innovation Technology Australia
- Integrity Data Systems
- Iomega
- IT National
- Jack Of All Games
- Jim's PC
- Jobnet
- Kingston Technology
- KM Computer Systems
- Kodak Digital & Applied Imaging
- LaCie Australia
- Landmark Computers
- Landmark IT Resources
- Lanyon Computers
- Leader Computer Systems
- Leading Pacific Australia
- Lemurian Technologies
- Lexmark
- Lidcam Technology
- Mac Troubleshooter
- MacroMax Computers
- Macromedia Asia Pacific
- MacSense Australia
- Mates Rates Computers Services
- MAUS
- Maxtek International
- Maxwell Optical Industries
- MegaPC
- Microdirect
- Micropaq
- MicroStar International
- Microstructure Computers
- Microtech Corporation
- Mindflux
- Minolta Q M S
- Minolta QMS Australia
- Mitsubishi
- Mobile PC Workshop
- Modtech
- Motorola
- Multimedia Technology
- Nevada Computer Services
- NETGEAR
- NetPlus Micro Computers
- newcomputers.com.au Box Hill
- newcomputers.com.au Oakleigh
- NoLimitz Computers
- Nortec Computers
- OA-Link
- Ocean Office Automation
- OKI
- Omega Computer Industries
- Online Marketing
- Organiser World
- Overclockerz Supplies
- Oztec Computer
- Palmwoods Computers
- Panasonic
- Parramatta Computers
- PAW Products
- PC Case Gear
- PC Case Mods
- PC Cooling Australia
- PC Repair Centre
- pcXtra Computers
- Peakhour
- Performance, Memory and Peripherals
- Peripherals Plus
- Peripherals Plus
- Perpetua
- Philips
- PICA Software
- Pinpoint Research Services
- Pioneer Computers
- Point Computer
- Systems
- Power Quest
- Pullman Computing
- Punch Technology
- Purpose Built Computers
- QD Innovative Computer
- Questek Components
- R.Gunz (Photographic)
- Rectron Electronics
- Ricoh Australia
- RTV Computer
- Sage Distribution
- Samsung
- Santacom Computers
- Sanyo
- Sato Enterprises
- Scorpion Technology
- Shane's Micros
- Sharp
- Short and Tall Computing Services
- Silicon Memory Technologies
- Sony
- Speedcom
- Surplus Computer Products
- Swann Communications
- Symantec
- TeamLink Australia
- Tech Pacific
- The Cartridge Man
- THX - The SONY I.T Store (Parramatta)
- Toowoomba Computerland
- Toshiba
- Trinitix Computers
- Tweak Town Shop
- Ulead Systems
- VideoBytes
- Viewsonic Australia
- WB Gamezone
- Western Computer Networks
- Xclusive Software
- Xenon Systems
- Yamaha Music

AirBlade

Welcome back to the future. Des McNicholas cuts full sick. Fully.



❶ FAR LEFT:
Look Ma, I'm a
mad cunx!
LEFT: Diamond
David Lee Roth's
influence on
cultural diversity
cannot be
underestimated.
Thanks Dave.

Hoverboards are it! Described by publisher Sony as 'as much a statement of attitude and intent as it is a game', Criterion Games' AirBlade has taken the physics out of skateboarding and thrown in a plot to match. Criterion has some well known form in this area, having developed the Dreamcast launch title TrickStyle, but this time racing takes second place to tricks and the completion of mission objectives. It's an interesting approach to a platform that teems with boarding games, and one that might just separate it from the crowd.

AirBlade throws players into the role of Ethan, an angst-ridden teenager with a taste for boarding. His friend Oscar has been kidnapped by a shadowy corporation that isn't too pleased with his early retirement – particularly since he selected his own parting gift in the form of a developmental hoverboard. Ethan teams up with Kat to find their friend, progressing through a series of mission-based levels as they go. Naturally, plenty of opportunities for tricks arise along the way, and new characters, moves and levels are unlocked as each stage is completed. Each of the six levels uses time limits and an excellent sound track to build up the tension.

AirBlade ships with a host of single and multiplayer modes in addition to the story, and some terrifically modelled urban environments to tear apart. After

a basic tutorial, single players can opt for Freestyle, Score Attack or Stunt challenges across any unlocked level, setting high scores along the way. Any boarders out there who actually have friends can play against up to eight of them in Party Mode (in which each gets one minute to clock up points), or choose from Score Attack, Trick List, Show Off, or the hilarious string chasing Ribbon Tag Mode. Criterion is looking at the possibility of online play in the future.

Controlling an airblade several feet above the ground will be a new experience to wheel veterans, and newcomers need to be prepared for a very steep learning curve. The board is continually moving forward and accelerating, and some pretty accurate momentum modelling ensures plenty of missed corners and the odd unplanned plunge from on high. Fortunately, the keypad controls are very simple, and the remarkably smooth frame-rate provides a quick response time to trick commands and well-judged changes in direction. Anyone familiar with SSX will be doing grinds, grabs, flips and combos in no time at all. Criterion has designed some stunning environments to show the airblade off to best effect, utilising the company's proprietary Renderware engine (Rayman, GTA). The settings are real world and, although not huge in area, they are extremely well detailed and full of trick-worthy features.

Stairs, ramps, pipes and the roofs of buildings all provide the chance to grab enormous amounts of air, and half the challenge is finding a route up to the next designated check point. There's also plenty of opportunity to do extensive damage to windows, cars and helicopters, with most things proving swing-able, smash-able or grind-able, and an airblade in the head – mid pike – is certainly an effective means of warding off evil henchmen!

AirBlade is an innovative title that breaks the mould and brings a new experience to the boarding community. It won't please racing fanatics, but the story-line is well developed and the missions provide plenty of opportunities to demonstrate superior air-grabbing prowess. The learning curve will put some players off, and it could do with more regular saves, but AirBlade is undoubtedly the best boarding release of recent times.

Tony Hawk, thanks mate, but there's a bit of Michael J. Fox in all of us. Embrace it.

atomic
8.5/10

GAME DETAILS

❶ **FOR:** Good story, nice break from racing, and fantastic environments. Terrific sense of urgency.

❷ **AGAINST:** Steep learning curve and the missions can become repetitive after a few attempts.

MINIMUM REQUIREMENTS: PS2, memory card
RECOMMENDED: Dual Shock Controller

DEVELOPER: Criterion Games www.criteriongames.com

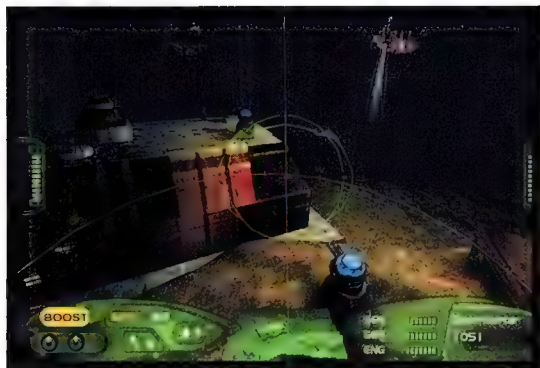
PUBLISHER: Sony Entertainment www.scee.com.au

DISTRIBUTOR: Sony Entertainment www.scee.com.au

PHONE: Sony Entertainment (02) 9324 9500

Aquanox

It's a benchtest and it's a beautiful game, says George Soropos.



❶ FAR LEFT:
These shots just
can't do the
game justice.
LEFT: A view
from the cockpit
of your mini sub.

Take a look at the recommended specs for this one, here is a real Atomican's game. Bigger your Quake 3 demos and your Counter-Strike strap-ons, here is a piece of gaming goodness that will really let your PC strut its carefully prepared and lovingly tweaked stuff!

Aquanox is the sequel to one of my favourite games of all time, Archimedean Dynasty, and as such had a big reputation to live up to. Both games were set firmly in the world of Aqua, our Earth far into the future when everything has been drowned under a vast ocean of water. And no, you won't find Kevin Costner wearing a leather G-string anywhere, thank God.

If you're trying to place the genre, think Wing Commander under water. Aquanox is a mission-based action title that starts out with our old pal Emerald Flint down on his luck again, and working his way up with a cheap boat and plenty of opportunities. German company Massive, the developers of Aquanox and Archimedean Dynasty, showed originality placing the game underwater and, remarkably, no-one has copied it in the meantime, which makes Aquanox fresh and enticing.

Massive didn't just do it to be different either, the increased friction and pressure of an underwater environment provides the perfect conditions for close in dogfighting and intense action. Your weapons are divided

between guns and torpedoes, and your ship is also able to be equipped with different engines, power plants, defensive turrets and counter measures.

The missions within the game encompass a wide variety of tasks and some are quite complex and require a lot of thought and creative use of resources to complete. In between missions are your visits to the various underwater stations that make up the corrupt and decaying world of Aqua.

Aquanox is an impressive technical achievement and a very beautiful thing to look at. If you want a game that's going to stretch the sphincter of your graphics card and then drive a bus through it, this is the one. However, fans of the original Archimedean Dynasty are in for a bit of disappointment.

The best feature of the original game wasn't the graphics but its atmosphere and character. Flint's voice acting was great, the brooding audio and story made you feel like you were a part of some futuristic Mike Hammer novel. Sadly, the marketing people got to Massive this time and the interface and structure have been, gasp, streamlined!

Apparently gamers used to get lost in the multiple mission offshoots, so now you pretty much do one mission at a time. Stations in Aquanox are now just dull one stop menus instead of actual locations to move around in, and even though the dialogue

is all spoken (instead of text), it actually makes you feel less immersed in the game as the voice acting is so bad. How bad? Some of the female voices are literally guys putting on squeaky, high-pitched voices like you used to do in third class, that's how bad!

It's a shame the developers didn't understand what made the original so good in the first place, or didn't kick its marketing people in the Lederhosen; but that isn't to deny Aquanox the praise it is due as a kick arse action game, and the best looking game made to date. What a pity then that no-one in this country has yet chosen to distribute it. The game is available in the US in a version that works perfectly well here (once you've got the 1.15 patch), so if you want to see what your GeForce3 can do, reach for your credit card and the nearest online shop.

atomic
8.5/10

GAME DETAILS

FOR: Most gorgeous game ever seen on the PC, great dogfighting action.

AGAINST: Cartoonish voice acting, lacks atmosphere of original.

MINIMUM REQUIREMENTS: Pentium III 600MHz, 128MB RAM, 16MB DX8 video, DX8 sound, 800MB HDD

RECOMMENDED: Pentium III/Athlon 1.4GHz+, 256MB RAM, 64MB DX8 video, 1GB HDD, SB Live!

SOUND APIs: DX8

VIDEO APIs: DX8

DEVELOPER: Massive Development www.massive.de

PUBLISHER: Fishtank Interactive www.fishtankgames.de

DISTRIBUTOR: None in Australia yet

PHONE: N/A

Rally Trophy

George Soropos reckons this game is rally, rally cool. Fully.



① FAR LEFT:
Live out
everyone's secret
fantasy, off-road
mini driving.
LEFT: There are
none of those
new fangled
sponsor laden
rally beasts,
these cars are
old and brown.

Rally racing has always been a European obsession. The sport has managed to take hold in places like Australia, where the locals appreciate a good hoon through the scrub, but it's never managed to crack the US market. If it doesn't happen in a venue where you can keep the punters huddled together all in the one place and sell 'em hotdogs the Yanks don't care.

It stands to reason, then, that the best rally games have all come out of Europe and this one is no exception. Rally Trophy is a seamless technical achievement that will appeal to gamers who appreciate eye candy (that's you Bennett) as well as good design. It is definitely the most visually attractive rally title to date, but in racing looks are secondary to feel and, these days, an original idea or two.

The original idea in Trophy has been slightly borrowed from other well-known racers such as Grand Prix Legends and Spirit of Speed and involves using some not-quite-vintage rally cars from the golden era (that is, before the Japanese had exported a single Datsun) of the sport.

Instead of racing a high tech Ford Focus with four wheel drive, constant speed differentials and a barely literate Scottish co-driver, you are instead placed behind the wheel of some natty '60s and '70s machines like the Mini Cooper S, Lancia Fulvia and the mighty Lotus Cortina. The extra trick with these classic rally

machines is that they've never even heard of four wheel drive.

Rear wheel drive rallying is an art that requires the greatest concentration, and a well trained accelerator foot. The wise thing to do is to start with one of the slower cars like the Mini and work your way into it. There are two main modes in the game: Rally and Arcade, with the essential difference being that the Rally mode only gives you access to four cars to begin with while playing the Arcade mode unlocks all but three of the cars for your driving pleasure.

Car handling is good and the cars are fun to drive, with the exception of a few old rattlers like the Volvo 122; however, one major fault with Rally Trophy is that it doesn't have enough of them. All up there are only 11 cars, with three of them locked in Rally mode. To be fair, however, there are already some new ones available on the official Web site for download, with more on the way, so Rally Trophy could eventually end up with more cars than any other rally title.

Between the races in Rally mode, Rally Trophy tips its hat to Colin McRae with almost identical menus and options. Your car setup menu is virtually the same with adjustments for steering, brake balance, gear ratios and suspension. Damage repair and performance adjustments eat up time between events just as in Colin McRae, but the damage is slightly more realistic in the sense

that it is more location specific and has a more marked effect on performance.

One thing McRae didn't have was wandering livestock and wild game. Depending on the country you are racing in various examples of the local wildlife can wander out onto the road and make a mess of your car if you're not careful. This element can add a lot of fun to close multiplayer games when someone ends up wrapped around a cow.

Another pleasant surprise from Eastern Europe, Rally Trophy is a great addition to a rarely visited PC genre and a bit of fresh air up your rally driving shorts. The demo was apparently the most downloaded at Gamespot for four weeks running, which isn't a bad sign at all. As a warning, if you play in Arcade mode with opponents on the track you'll need a grunty PC with a GeForce3 to play at a decent frame rate

atomic

8/10

GAME DETAILS

○ FOR: Gorgeous to look at, fun to play.

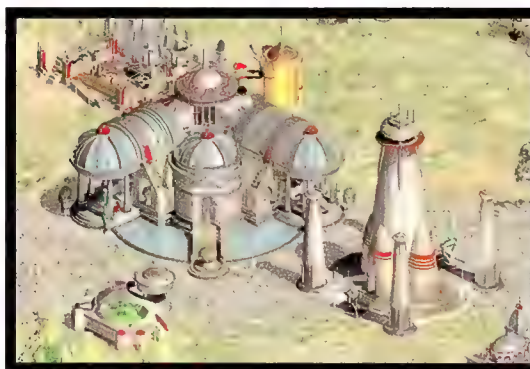
○ AGAINST: No Toranas.

MINIMUM REQUIREMENTS: Pentium II 450MHz, 64MB RAM, 8MB video, DX sound
RECOMMENDED: Pentium III, Athlon 1GHz +, 128MB RAM, 64MB video, surround audio
SOUND APIs: DirectX, Miles 2D
VIDEO APIs: DirectX 8.0a

DEVELOPER: Bugbear www.bugbear.fi
PUBLISHER: JoWood www.jowood.com
DISTRIBUTOR: Red Ant www.red-ant.com.au
PHONE: Red Ant (02) 98823791

Star Wars: Galactic Battlegrounds

Great shot Des McNicholas! That was one in a million!



FAR LEFT: Battlegrounds has plumbed the depths of the universe for new RTS environments. **LEFT:** Structures are well modelled and architecturally unique to each civilisation.

Plonked neatly onto the Age of Empires II engine, Star Wars: Galactic Battlegrounds gives players the chance to control their favourite Star Wars characters and races in traditional RTS style. While its origins are evident in almost every aspect of gameplay, Battlegrounds captures the feel of the saga nicely and brings enough new features to warrant more than expansion status. It looks good, and the range of units, missions and sound effects will make it a very satisfying experience for Darth Vader disciples and newcomers alike. Despite some reports, Battlegrounds is much more than just William Wallace on steroids, and the Star Wars franchise finally delivered a credible strategy game for fans of the series.

Battlegrounds offers six campaigns (one of which is a tutorial) based around the key races of the Star Wars' universe; some interesting variations on the single mission theme; a complete campaign and mission editor; and multiplayer for up to eight players. Gungans, the Rebel Alliance, Wookies, the Royal Naboo and the Trade Federation each bring unique characteristics and units to the game, though it's still a little too well balanced – and players with a taste for the dark side also have a chance to lead the Empire on the road to galactic domination. The tech trees show a good mix of forces and structures, and the


introduction of aircraft, power supplies and advanced technologies makes for some original combinations.

Though some missions have purely military objectives, most require the gathering of resources, the growth of civilisations, and the defeat of enemies. The resources in this case are carbon, food, nova crystals and ore. The need for short-range power cores puts a check on uncoordinated expansion, forcing players to build their civilisations and forces up gradually. When combined with research, the refinement of natural resources forms the basis for advancing to the next level.

Direct comparisons with AOE II are unavoidable, but Battlegrounds' control interface is simple, pretty much intuitive for anyone with RTS experience, and very nicely presented. While the Command Menu fills a little too much of the screen, everything is available at a glance and situational awareness is very high. Single units and groups are easily directed, with things such as formations, stances and specific orders issued via simple push buttons or short cut keys. The status of all units and structures is readily to hand, construction progress is shown graphically, and the excellent mini-map can be configured to present only the information required.

While the campaigns don't offer much in the way of surprises, Battlegrounds' settings

allow for some interesting environments and varied terrain. Swamps, asteroids, satellites and locales from the films are all available for single play and multiplayer. Players will be particularly happy with the ability to control the major characters from the Star Wars saga, and considerable resources will be spent protecting them during some missions. Trade and diplomacy are handled in a largely automatic way in single player mode, but they take on more importance in multiplayer thanks to the ability for Allies to use each other's equipment, provide warning of attack and share key resources.

Star Wars: Galactic Battlegrounds can be criticised for its obviously derivative nature, but it remains a quality title that will please Star Wars fans and those looking for a variation on the RTS theme. 

atomic

8/10

GAME DETAILS

FOR: Innovative settings, sticks very closely to the Star Wars theme, command Storm Troopers!

AGAINST: Not much new from an RTS perspective, forces are a little too balanced, shallow campaigns.

MINIMUM REQUIREMENTS: Pentium II 233MHz, 32MB RAM, 650MB HDD, 2MB DirectX compatible video card
RECOMMENDED: Pentium II 500MHz, 64MB RAM, 16MB video card

SOUND APIs: Direct Sound

VIDEO APIs: Direct3D

DEVELOPER: Lucas Arts www.swgalacticbattlegrounds.com

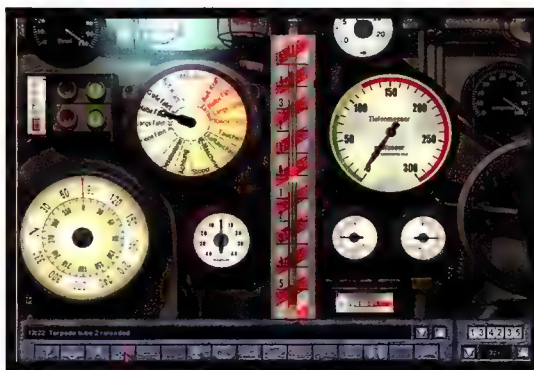
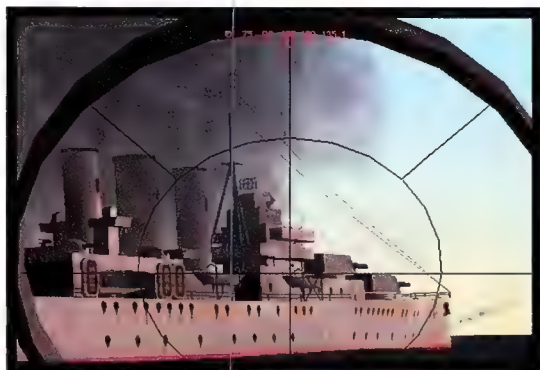
PUBLISHER: Electronic Arts www.ea.com.au

DISTRIBUTOR: Electronic Arts www.ea.com.au

PHONE: Electronic Arts (03) 9882 1222

Silent Hunter II

The first ever sub game review intro that's smut-free. Courtesy of Des McNicholas.



FAR LEFT: You don't ever want to get this close. **LEFT:** The control panels are well modelled, keeping you on top of things as you navigate Scapa Flow.

Silent Hunter II has some big shoes to fill, worn previously by Aeon's Silent Hunter and Dynamix's classic *Aces of the Deep*. With the new team of Ultimatum and UbiSoft at the helm, it has emerged from a traumatic development process as a solid game, albeit one that doesn't quite meet expectations. SH2 ships with one campaign, eight single player missions, a rudimentary mission generator, a ship ID database and an interview with U Boat Ace Eric Topp.

The linear nature of the campaign will disappoint some players, as will the lack of an in-mission save feature and the requirement for each mission to be successfully completed before the next one is unlocked. Unsuccessful patrols were part and parcel of U Boat operations, but the result here is often repetitive tedium rather than increased tension – particularly if failure is down to faulty torpedos! The historically-based single player missions are well handled, and the mission generator produces some interesting engagements.

Ultimatum has introduced a very solid control interface, utilising a combination of onscreen buttons, shortcut keys, and an invaluable pop-out side panel. Captains can now give all key orders from any station, maintaining situational awareness and reducing the need to continually jump between screens. Although no attempt has been made to recreate the control

room or other interiors, the boat's stations are well modelled 2D affairs on which the majority of gauges and dials function accurately. A captain's cabin is provided, complete with log and calendar, but it doesn't add much to the game.

Although ship hunting was a fairly comfortable proposition for the Germans during the early stages of the war, convoys, radar, sonar and air cover made things a little more tricky as things progressed, and SH2 captures the emerging themes of tactics and technology very nicely indeed. The campaign story is engaging – the very first mission involves sinking a couple of Polish destroyers 'with a minimum of fuss' before hostilities are formally declared – and success is rewarded with promotion, medals, new equipment, and new boats.

A host of configuration options is available for new players, specifying the degree of difficulty via a simple checkbox. Torpedo performance, fuel, and depth settings can all be modified, as can battery life, visibility and vulnerability. The AI still takes on a fair bit at the higher difficulty levels, but Ultimatum has struck a fairly good balance between running the boat and doing the dirty work. Fortunately, there's still plenty to do once you're discovered in the wrong place – including controlling the main armament and machine guns – and the time progression feature skips quickly past the boring bits.

There's no doubt that SH2 shows all the signs of a game pushed out early because the publishers grew (understandably) weary of waiting. The campaign lacks any pretence at a dynamic element, the game as a whole demonstrates a few questionable design decisions, and the graphics don't reflect the advances of the last few years. Even so, Ultimatum has done a very good job in most areas, with challenging missions, an atmosphere that far exceeds the almost sterile original, and a good stab at historical accuracy. The lack of any recent alternatives will no doubt attract many depth-charge starved veterans to the single player game, and the promised online compatibility with *Destroyer Command* should see Silent Hunter II emerge as a worthy successor to the great submarine simulations of the past.

atomic
8/10

GAME DETAILS

FOR: Tense atmosphere, high degree of technical accuracy and the promise of online expansions.

AGAINST: Very linear, lack of 3D interiors and the campaign structure can become repetitive.

MINIMUM REQUIREMENTS: Pentium II 266MHz, 64MB RAM, HDD 650MB, 16MB DirectX compatible video card

RECOMMENDED: Pentium III 600MHz, 128MB RAM, 32MB DirectX compatible video card

SOUND APIs: Direct Sound

VIDEO APIs: DirectX3D

DEVELOPER: Ultimatum www.ultimatum.com

PUBLISHER: UbiSoft www.ubisoft.com.au

DISTRIBUTOR: UbiSoft www.ubisoft.com.au

PHONE: UbiSoft (02) 8303 1806

Handa mana granda spanna

This carefully selected sample selection of Atomican's tech woes has been brought to you by Mr www.dansdata.com Rutter. Many other, generally less interesting stories of technical misery can be found in the tech sections of www.atomicmpc.com.au. The saddest and/or funniest and/or most informative letter scoops the gadget below from www.anyware.com.au. Now, about that rash...

i Letter of the month: WinXP on O@H?

I really liked your review of Windows XP, so I went out and bought it. The only problem is, we have Optus cable, and it currently doesn't support it. It won't be supporting it until March 2002. Any tips or advice so I can suck it down my phat pipe?

Mitchell

The O@H supported-operating-systems list just tells you what OSes you can use if you want Optus phone support to help you with configuration problems. As long as you don't want tech support related to your OS, you can be running Linux on a Sega Dreamcast and still connect to Optus cable.

O@H's special installer software might not work on other OSes, but all the software does is change a couple of simple system settings.

O@H used to have the normal @Home hostname-based authentication scheme, in which every user's given a "co1234567-a" sort of hostname to use.

My friend at Optus tells me that O@H is now authenticating by cable modem MAC address, which means your hostname can be anything.

Any computer connected to the cable modem that has TCP/IP bound to that network adapter (without File And Printer Sharing bound to that adapter as well, unless you really want to share everything with the universe...) should be able to get an IP address via DHCP – which is the default Windows behaviour.

Thus, be rocking and rolling on the Net with no further fooling around at all.

Glide was 3dfx's proprietary 3D Application Programming Interface (API), and nobody else was allowed to use it. 3dfx got eaten by NVIDIA, but NVIDIA has no plans to incorporate Glide support in drivers for its own chipsets, because only games a few years old – like Red Baron 3D – are unable to use some other API instead. There are various other older games that support Glide but also support Direct3D and/or OpenGL; getting those working on a current system isn't a problem.

The only way to get Glide-only games working on a non-3dfx graphics card is by using 'Glide wrapper' software. Quite a few Glide wrappers have been made over the last few years, each with its own set of amusing character traits. You can see a pretty comprehensive list at www.voodoofiles.com/type.asp?cat_id=13.

Note that several wrappers are made for some particular application, like the UltraHLE N64 emulator, or for some particular video card chipset. The ones that are meant to work on NVIDIA hardware may work on yours. Emphasis on the 'may'.

You can't use any normal Glide drivers on anything that isn't a 3dfx-chipset graphics card.

Why's the Pentium III so expensive? Because Intel is phasing out the Pentium III for desktop applications, but people still want to buy them. So the price is going up.

Intel is making plenty of 1.5GHz Pentium 4s at the moment; in the build-it-yourself market, Pentium 4 supply is exceeding demand.

Since a system based on an Athlon XP 1500+, or even a 1.2GHz Duron, is cheaper and faster than either the Pentium III or Pentium 4 options, there's not exactly a stampede for Pentium 4s.



i Whither Glide?

I purchased a Pixelview Geforce2 MX200 to update my Pentium II 350MHz, 256Mb PC. Works much better with fairly recent flight sims, car racing and so on. However, on the older European Air Wars and Red Baron 3D, it has completely wrecked the maps and scenery. Why? Both games used 3dfx Glide.

On installation I downloaded the latest NVIDIA drivers, but that didn't help. If GF2MX200 doesn't support Glide, what does that mean? Could I force the card to use the Glide drivers from Atomic's illustrious yearly CD-ROM (thanks fellas, great stuff)?

Also, will you please be reviewing Gigabyte's GA-60XET mobo with 1.2GHz Pentium III (0.13 micron) for gaming, especially FSs?

This is a very good affordable mobo I believe, but why does Intel want to slug us \$650 for the excellent fast cool processor, when a Pentium 4 1.5GHz is half the price?

Robert Gott

i -5 IBM G94 Of Darkness

I have an IBM G94 19in monitor. The manual says refresh rate is 85MHz on all displays up to 1,200 x 1,600.

I have an Asus V8200 deluxe video card. When I install the Asus v21.81 drivers, (I have reformatted four times recently, each time this happens), and I choose Optimal for refresh rate, it sets it at 100MHz. I then usually set it back to 85 just to be on the safe side.

Can't find any info on whether this monitor supports 100MHz. If it is set to Optimal, will it only do what the monitor can handle? Is it safe to run at 100MHz?

I used to have a Asus V7700 Deluxe card, and when I ran games at 1,200 x 1,600 the screen would go dark. I have tried with 60MHz refresh but still the same. I thought it might be the card, but the GF3 does the same. It will run great one resolution down from 1,200 x 1,600, but at 1,200 x 1,600 it's just dark.

Is my monitor dying, as I'm sure I could put that res on before without it going dark? Could it be that when I run at Optimal refresh and it was set at 100MHz it has damaged my monitor?

Blackdragon

First up, it'd be hertz (H), not megahertz (MHz).

Refresh rate, the rate at which a CRT screen is redrawn, is measured in hertz cycles, or in this case frames, per second. Canonically, the flicker stops being noticeable from about 72Hz upwards, though most people find 85Hz and higher looks noticeably better than 75Hz.

No monitor specification will be in megahertz (millions of cycles per second), but the available horizontal frequencies will be measured in kilohertz (kHz) – thousands of cycles per second. The horizontal frequency is the number of lines the monitor can draw per second.

Divide the maximum horizontal frequency a monitor can manage by the number of lines in a given resolution – 768 say – plus a bit to give the electron beams time to get back from the bottom right corner to the top left one, and you've got the maximum refresh rate the monitor can possibly manage at that resolution.

IBM's specs for the part number 654940N G94 monitor (www.pc.ibm.com/qtechinfo/wwwcat/c654940N.html), which is what I presume you have, say that it can manage refresh rates from 50 to 160Hz. The monitor's maximum horizontal frequency is 95kHz. So in 1,600 x 1,200, with 1,200 lines to draw per screen, the monitor will be able to manage a refresh rate of less than 79Hz; 75Hz, in fact, according to its specs.

If you're using a monitor driver – which is really little more than a list of resolutions and refresh rates – that makes Windows think that your monitor can do a higher refresh rate at a given resolution than it really can, then the 'Optimal' refresh rate setting will leave you looking at a black screen on any fairly recent monitor. Old monitors try to display out-of-range signals and give you impressive scramble vision as a result; more modern ones display nothing when the signal's beyond their capabilities.

Try a monitor driver of some other similar screen; perhaps the G94 driver just doesn't have the right numbers in it. You can also use a proper display-tweaking utility like Powerstrip (www.entechtaiwan.com/ps.htm) to hard-set resolution and refresh rate as you like.

i Network basics

I'm interested in setting up a network in my home. Should I use a crossover cable or a hub? What types of network cards should they be? I would be using it mainly for games, and possibly Internet sharing. Which card would be adequate: a 10Mb/s or a 10/100Mb/s card? What brands do you think are good and how much are they?

Jonathan C



What kind of network hardware for a home LAN? The cheap kind.

A crossover cable's the simplest way to connect two computers with 10BaseT or 100BaseT network adapters (the ones with the telephone-style RJ45 connectors) together, but you can only connect two computers that way. If you want to connect more, you need a hub or switch, with sufficient ports for the number of nodes you want your network to have.

All of the cheapest network cards these days are '10/100' compatible; they'll default to running in 100Mb/s 'Fast Ethernet' mode, but they'll also work at 10Mb/s if you connect them to a network running at that speed. For Windows users, any old cheapo-card should be fine.

There's a lot more that can be said about basic PC networking. Fortunately, I've already said it on my Networking Explained page at www.dansdata.com/network.htm.

i You're sorry... ?

I have a Dell Optiplex GX150 Running Windows XP Professional and all of a sudden, whenever I open anything or do anything, or even when I log on, it gives me a message that says 'Devldr32 has encountered a problem and needs to close. We are sorry for the inconvenience.'

Ben

Apparently, some software installations overwrite devldr32.exe with their own version, which doesn't work properly. Sound Blaster Live! users, in particular, are reporting this problem. Rumours that Creative's driver team is composed entirely of gorillas enthusiastically beating on their keyboards with their feet have not been confirmed.

If you find and open the drivers.cab file on the Windows XP CD, you can copy the devldr32.exe file to the system32 directory in your Windows directory, and it'll overwrite the devldr32.exe you've got at the moment. Which may solve the problem.

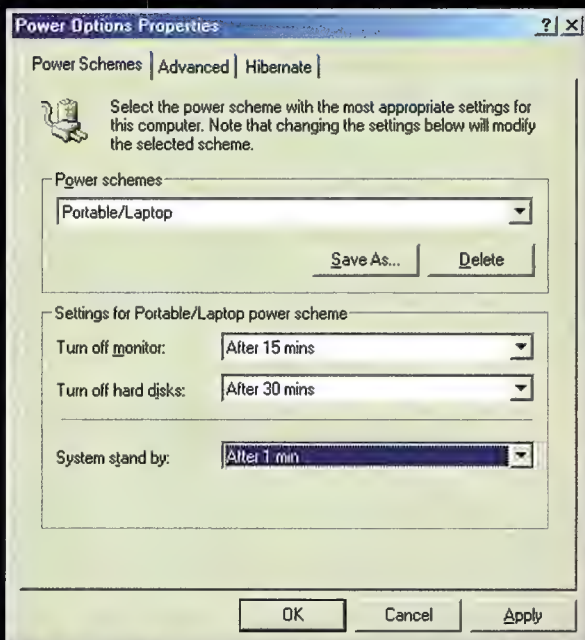
i Narcoleptic computing

I have just bought a Panasonic MX7 MiniDV camera, which came with a FireWire card and Ulead Video Studio 4.0 SE. I run a Celeron 466MHz, and I'm not sure what MB it is.

Recently my sister married and after working through a whole day of film I finally finished the editing on my computer. Now I have to render the movie, which will take about 30 hours.

I leave it running, but every time I come to check on it and take the computer out of standby, the program has stopped working and the rendering process has ceased. I cannot continue where it left off, so have no choice but to start again, and still the same thing happens. I have tried everything to stop the computer from going into standby, but to no avail. I have switched off all screensavers and in the BIOS power section I have disabled all power saving modes and put everything on 'always on', but still the computer goes to standby after every 20 minutes. If it was a short movie and the rendering took only five hours then maybe I could go and move the mouse every 20 minutes, but given it's 30 hours, if I miss a turn and do not move the mouse in time the rendering stops again. It's been over a month and I still haven't found a way to finish my movie. Don't laugh, but I have even tried taping the mouse to my hand while I sleep, so hopefully my hand will move the mouse!

Martin



i Drive a newbie bananas! Set the standby timeout to one minute.

o (To the tune of On Top Of Old Smokey):

'Reinstall Wiiiiiiin-dooooows,

'Til you're old and greeeeeeeey...'

(GONG!)

Well, that's one option. It's perfectly possible that Windows has wedged itself in such a way as to be unable to avoid

standing by when you don't want it to.

Before you nuke from orbit and reinstall, though, make double sure that in the 'Energy saving features of monitor' subsection of the screen saver display properties tab (the names may be different, depending on what Windows flavour you're running), you haven't got a 20 minute standby timeout set. That setup dialog box covers a lot more than just monitor blanking.

A firmware (BIOS) bug is another possibility. Various PCs have BIOS problems that let you turn some feature on or off in the BIOS setup, without actually changing the system's behaviour. Fortunately, your computer is young enough that it almost certainly has a user-upgradable 'flash BIOS', though you may need to move a jumper on the motherboard to make the BIOS writable.

To update the BIOS, you'll need to find out what motherboard your computer's using, and then head off to the manufacturer's site and get the latest BIOS, the update utility, the satchel, the junk mail and, of course, the towel.

i Quick tips

A couple of tips to round out this month's column; one from a reader, one from me.

Easy Messenger squishing

Sicarius123 writes: 'I was reading the "Atomic XP Optimisation Guide" in Issue 11 when I noticed that, to disable Windows Messenger at startup, you recommended editing the registry or deleting Messenger... These methods aren't easily reversed, and affect all accounts when it might only be one user that doesn't want Messenger.'

'I'm running Windows XP Professional and have successfully disabled Messenger two ways. If you have a clean install, go to Start | Run | "msconfig" | Startup and untick "mmsgs". If you have upgraded to Messenger 4.5, open it up and go to Tools | Options | Preferences and untick "Run this program when Windows starts". Now Windows Messenger no longer starts up when you log on'.



Easy stopping

I take a lot of digital pictures. I move them to my Windows 2000 PC via a USB card reader. USB storage devices under Windows 2000 have to be 'stopped' before you unplug them, if you don't want to see a snifty message from your operating system and possibly have to deal with file system corruption. Inconvenient!

You can stop devices by double clicking the little Unplug or Eject Hardware icon in the system tray, then clicking Stop and OK. And so I did that. Often.

Then I discovered that you can just hold the left mouse button on the Unplug or Eject icon, and you'll get a neat quick stop menu. Not as good as true hot plugging, but better in a better kind of way.

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Unlocking the Athlon XP

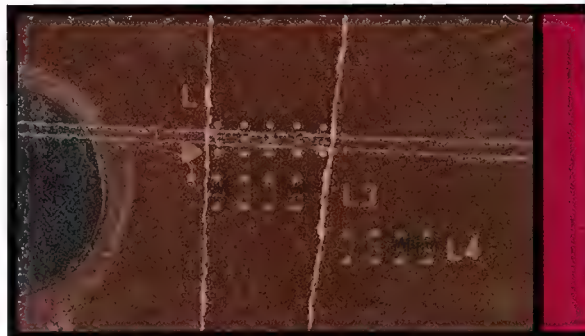
The Athlon XP realises its full potential with the help of Bennett Ring.

We all know how well the Classic and Thunderbird Athlon overclocked, so it's no surprise that owners of the new Athlon XP want to see how far they can push this new design before it reaches the point of silicon suicide. Unfortunately, overclocking the Athlon XP isn't quite as simple as yanking out an old pencil and playing dot to dot with the L1 bridges (see *Issue one, page 67*). This is thanks to a laser trench the size of a Death Star canyon (if the Death Star was 5cm in diameter – Ed.) between the points of the L1 bridges, which stops the pencil lead from joining the two points of each L1 bridge. But what if you were to fill in this gap and then join the severed points? I think we might be on to something here.

The list of products needed to unlock the multiplier on the Athlon XP reads more like the ingredients for a shiny Christmas tree decoration than a CPU mod; Super Glue, silver conductive lacquer, a scalpel blade, sticky tape and a magnifying glass are all you need to get you on your way to high frequency heaven. The total cost of all these products is the princely sum of around \$15, which compares well to the few hundred dollars you'd need to buy a faster CPU. Obviously, the biggest drawback is that your warranty will be voided if you try to return the CPU.

Step 1

Before we commence joining the bridges, it's a good idea to thoroughly clean the area on and around the L1 bridges. We always use Isopropyl Alcohol to clean our CPUs, and we soon had the L1 bridges shinier than a shiny thing that had just been shined.

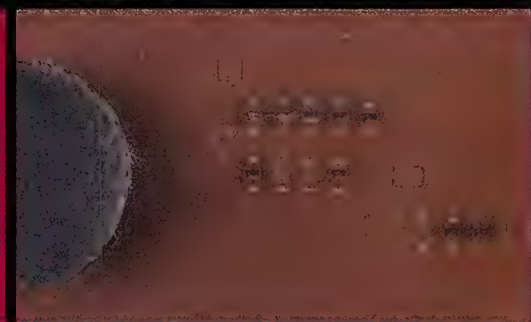


Step 3

Now we need to horizontally mask off both the top and bottom row of L1 pins, leaving only a small horizontal gap over the laser cut trenches. Make sure that the L1 pins are definitely covered when you are masking it, as you don't want to cover these with Super Glue. Then use a small piece of tape at either end of the L1 bridges to make sure the glue doesn't go to the left or right of the pins. The image above of the full mask in place should clear up the confusing instructions just given. You can see that there is a gap in the mask over the trenches.

Step 4

It's time to bust out that Super Glue. We used a scalpel blade to apply a thin layer of Super Glue to the unmasked area, making sure that each of the five trenches were completely filled. Leave this to dry for the recommended drying time.

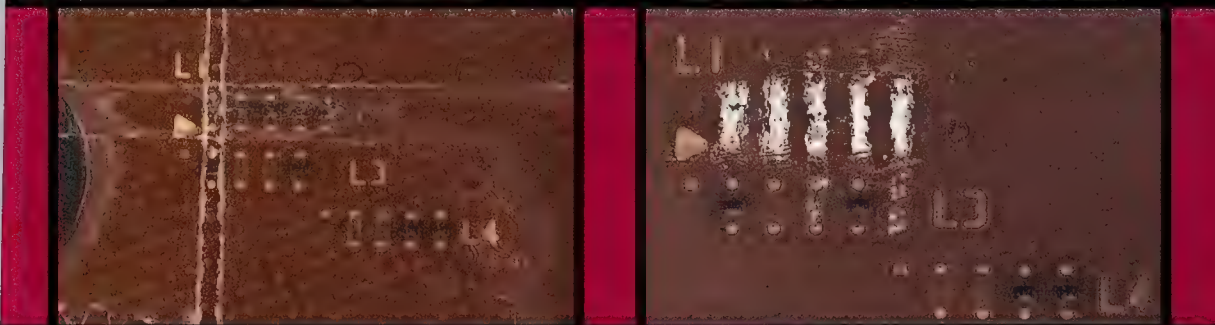


Step 2

It's time to use your magnifying glass. Each of the trenches between the L1 pins will still have some blackened crud left behind from the laser cutting process. Using a very sharp object, such as a needle or the point of a scalpel, clean out each of the trenches so that you can see the copper in the base of each trench. Remove the rubber support near the L1 bridges so you can apply the tape.

Step 5.

After the Super Glue has totally dried, remove the sticky tape mask that is protecting the L1 pins. Using a sharp scalpel blade, scrape off the excess Super Glue, making the surface between the L1 pins as flat as possible. Ensure that the trenches remain filled with glue. If any of the Super Glue managed to get underneath the mask and cover any of the L1 pins, simply scrape it off with the scalpel.



① Step 6

Now that we have successfully filled the trenches with non-conductive material, we need to connect each of the L1 bridges. Apply a vertical strip of sticky tape to both the immediate left and right of the first L1 bridge, as well as a small horizontal strip just above the top point and another just below the bottom point of this first bridge. You should be left with a small open area over the first bridge. Try and apply each vertical strip as close to the L1 pin as possible, so that when you move onto the next bridge you'll have the room to manoeuvre.

Step 7

Give the silver lacquer a good shake before applying, as the silver is prone to settle at the bottom of the bottle. Fill the unmasked area over the first L1 bridge with the silver lacquer, using the point of the scalpel, before leaving to dry for several hours.

① Step 9

Repeat Step 5 through 7 for each bridge, masking them off individually before applying a coat of silver lacquer. Make sure you let the silver lacquer dry thoroughly before moving onto the next bridge; otherwise it will be removed when you pull the sticky tape off. You should be left with five connected bridges. If one bridge is connected to another by a bit of rogue silver lacquer, simply scrape away the connecting lacquer, so that you are left with five perfectly separated bridges. The shot above is a little bit messy, as we had to do a rush job for the photos.

Step 10

Cover the reconnected bridges with a small piece of sticky tape to ensure your handy work stays intact before gluing the heatsink-supporting rubber dot back into place. Install the Athlon XP into your motherboard and increase your CPU Vcore to 1.85V. Start increasing your multiplier by 0.5 increments until it becomes unstable. Lower back to the last stable multiplier – we managed to increase our 1.53GHz Athlon XP 1800+ to a core speed of 1.79GHz. This is around the same speed the unreleased Athlon XP 2000+ or 2100+ will be running at when it hits the shelves.

While this overclock isn't quite as impressive as the 50% overclocks the Thunderbird Athlon was capable of, an overclock of 17% is still nothing to be sneezed at. And let's not deny how cool it is to have a CPU running at the speed of an unreleased CPU. If you've got exceptional cooling and have voltage modified your motherboard to crank out 2.1V of CPU Vcore, you'll probably reach even higher speeds, as multipliers up to 18X will now be available for your Athlon XP. In theory, this allows you to reach a frequency of 2.4GHz, but don't expect to reach it. □

① Step 8

Remove the sticky tape mask, and your first L1 bridge should be perfectly connected by the silver lacquer. If you masked the other bridges properly, the silver lacquer should not be covering any other bridges on the CPU, just like the image above. You can use the scalpel blade to tidy the reconnected bridge if some of the lacquer managed to get under the sticky tape mask.

Jaycar Electronics kindly supplied the gear we used to unlock our Athlon XP. They can be contacted on (02) 9267 1614, or visit the Web site at www.jaycar.com.au.

The Ghetto UPS

Want to build a UPS out of some paperclips, thermal paste and one football sock?

Who needs MacGyver when you have Daniel Rutter.

You know what an uninterruptible power supply looks like, right? It's a heavy beige box with an IEC socket on one end, one or more three-pin sockets on the other, a few lights and buttons.

Well, it can be.



① Check out the Atomic super happy lucky golden star D.I.Y. power supply, with double adaptor included.

Or it can look like this.

This contraption works in basically the same way as a normal "dual conversion" UPS. Next to the computer, there's a big fat DC power supply, with a battery sitting on top of it. That power supply's connected to the mains on one side and to the battery and an inverter (the box on the right), in parallel, on the other. The power supply charges the battery and runs the inverter, while mains power lasts.

The inverter converts the low voltage DC back to AC power, with an efficiency of more than 85% - 100 watts of DC in, about 90 watts of AC out. If the mains power fails, the inverter just runs from the battery, and the computer (and monitor) keep on trucking. For a bit more than an hour, from this small-ish battery. When you compare this to the prebuilt UPS's that you can buy for a small fortune, an hour seems an eternity.

Many off-the-shelf UPSes can only provide power for a few minutes - long enough to save your work and shut down. All but the cheapest models have a serial connection to the PC and software that lets the computer shut itself down if you're not there when the UPS is doing its thing, and battery power's getting low. With a Franken-UPS like this one, though, you can have as much battery backup as you can fit in your computer room, although it won't turn off your PC when the battery power starts moving towards the lower end of the scale.

A dual conversion UPS like this runs the inverter all the time. Most UPSes don't do that. They're 'standby power supplies' instead, in which the inverter only runs when mains power fails.

The rest of the time, they just pass mains power through to the output, maybe with good filtering, maybe without. The standby design makes the UPS more efficient, and also allows cheap units to have lower quality inverters, because the inverter hardly ever has to do anything.

There are also 'line interactive' UPSes that run the inverter all the time, not at anything like full capacity; they also pass mains power through while it's available. When power fails, the already-running inverter just picks up the slack.

Dual conversion, or 'online', UPSes provide the best power filtering and have no 'cut-over' delay if the mains fails; but for domestic purposes there's not much difference, besides the price range, between the three flavours.

If we're going to build a UPS, we might as well build the type that has the most benefits. So the do-it-yourself UPS we're constructing for this article is of the dual conversion flavour. It's about as elegant as it looks, and most people wouldn't want it, but Atomicans aren't like most people.

It also lets you see what's inside a normal single-box UPS, so should give you a clear view of just how these little boxes of electrical mystique do their thing. What better way is there to learn about something than to build it? All of the components you see within this setup are just standalone versions of the basic bits inside a regular UPS.

'... the do-it-yourself UPS we're constructing for this article is of the dual conversion flavour. It's about as elegant as it looks, and most people wouldn't want it, but Atomicans aren't like most people.'

**'UPSes need lots of battery capacity,
and don't have to be particularly light.
So they use lead acid batteries.'**

The battery

UPSes need lots of battery capacity, and don't have to be particularly light. So they use lead acid batteries.

Off-the-shelf UPSes – well, the ones that are small enough to carry without the aid of a robotic exoskeleton – use 'gel cells', also known as Sealed Lead Acid (SLA) batteries. These batteries are cheap, they don't leak, they can be bought in any electronics store, and they provide reasonable performance for money.

The jelly electrolyte in a gel cell, though, doesn't deal well with gas bubbles, which develop quickly if it's overcharged and slowly even if it's just kept constantly topped up. The bubbles mess up the electrolyte next to the battery plates, which reduces capacity.

Cheap SLA batteries are also definitely built down to a price. The saying 'you pay for what you get' exists with reason. Your ordinary 'seven amp-hour' 12 volt SLA brick may or may not be able to deliver as much power as you'd expect from that rating, even in the lower-current two-battery 24 volt configuration that a lot of UPSes use. Don't expect more than a couple of years of life out of the bargain-priced SLA batteries that reside within a cheap UPS.

For a ton of capacity and excellent high current performance, 'wet' lead-acid batteries with ordinary liquid sulfuric acid electrolyte are the way to go. You don't want to knock them over; you don't want to carry them up stairs, but even a little car battery will give you 25 genuine amp-hours for computer-powering purposes. Only your ability to transport heavy objects limits the capacity you can get from wet batteries in parallel.

Automotive batteries can be had cheaply, but they don't like being fully discharged. Neither do ordinary gel cells. Run any lead acid battery flat and leave it that way long enough and the plates will sulfate, rendering the battery useless.

More expensive 'deep cycle' batteries are constructed to deal better with this; they don't have the massive instantaneous current capacity of a 'cranking' battery if you want to start an engine, but you can run them through full cycles over and over without harm. They still shouldn't be left flat, though.

Our battery isn't a normal wet cell, or an SLA. It's a Lifeline GPL-1300 from Concorde Battery Corporation (www.concordebattery.com), where batteries for everything from racing yachts to fighter planes are made. This one's a sealed, valve-regulated design with liquid electrolyte absorbed onto fibreglass mat between the tight-packed plates. This gives it the performance of a wet battery, and the unspillability of a gel cell.

The GPL-1300 is Concorde's smallest battery – it weighs less than 7kg. But it's rated to start a two litre marine diesel, and has a genuine 13 amp-hour capacity for UPS applications.

You're looking at around \$250 for one of these, though.



① Nothing but the best for an Atomic UPS. This Lifeline 12 volt is the Rolls Royce of car batteries.



① ... and the rear of our Rolls Royce battery. You know, they probably use these things in Rolls Royces.

The inverter

This is a 300 volt amp (VA), 12 to 240 volt inverter of slightly elderly design, with a not so great surge power rating – the amount of power it can deliver for a brief moment. Watts may equal volts times amps, but only for DC circuits, or AC circuits running purely resistive loads, like heaters or incandescent lights. Computers and monitors aren't resistive loads. Technically speaking, they have a pretty nasty 'power factor'. A 300VA inverter can run only about 210W worth of PC gear. Just because a computer has a 300W PSU, though, doesn't mean it needs a 430VA inverter. It'll only need that if it fully loads every one of its PSU's output rails, which it almost definitely doesn't.

These days, you can get a 300VA inverter with a 900VA surge rating and better than 90% efficiency for about \$160 – Jaycar have one, MI-5062, at that price. For less than twice the money, you can get a 600VA continuous, 1,500VA surge inverter, which is enough to run pretty much any PC and its monitor.

Surge rating matters, because many devices draw a lot more current on startup than they do when they're running. Laser printers and refrigerators, for example, have such huge startup current demands that you need an apparently massively overrated inverter if you want to run them. Computers aren't that bad, but CRT monitors can still be a problem. The computer I used from this rig is a humble Celeron box with a 15in monitor. The PC without monitor draws a peak current of about 8.5 amps from the battery, through the inverter, on startup. Then it settles to less than six amps. The monitor's degauss circuit, though, draws more than the peak power capacity of the inverter.

Since practically all CRTs automatically degauss when they're powered up, that's a problem. Another 15in monitor I tried just pegged the needle on my ammeter for a moment when turned on, and then sat there in standby mode. Fortunately, the old Mitac monitor can still start up when it tries to degauss itself and fails. It just draws a nice steady eight amps, with no scary surge. So the PC with monitor has a peak draw of a bit less than the inverter's constant output capacity, and then settles down to about 70% of capacity.

The solution to the monitor surge problem is either to use a more modern inverter with a big surge rating, or to use a lower power monitor, like an LCD screen. Fifteen inch LCDs draw less than 40W and have no startup surge to speak of. Excellent candidates for 'alternative power' applications.

Inverter waveforms

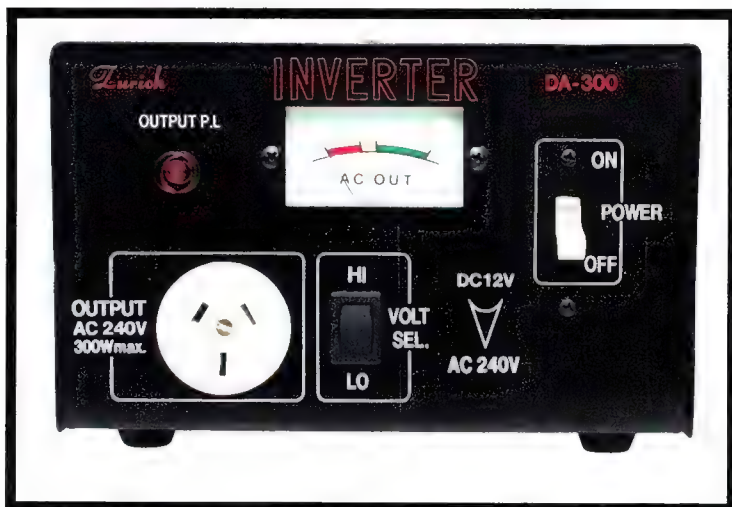
The 'waveform' of an inverter is how the inverter's output voltage changes as it goes through its positive/negative alternating-current cycles. The rate of oscillation for all Australian 220/240 volt inverters should be the same 50Hz (cycles per second) as ordinary mains power; but the voltage-versus-time graph of an inverter's output can be quite different from that of mains power. If, for example, the voltage rises practically instantly to full positive, holds there for half a cycle, then drops practically instantly to full negative for the other half-cycle, then you're looking at a 'square wave'.

Normal mains power alternates in a smooth sine wave – well, it does when it's not being polluted by spikes and sags and surges. Which unfortunately occurs all too often. Just ask any PC power supply. The sinusoidal waveform, shown in green in the picture below, is only accurately imitated by more expensive 'sine wave' inverters. You can buy UPSes that have sine wave inverters – you're looking at maybe \$900 for a 750VA line interactive one. You can buy sine wave inverters as separate items, too.

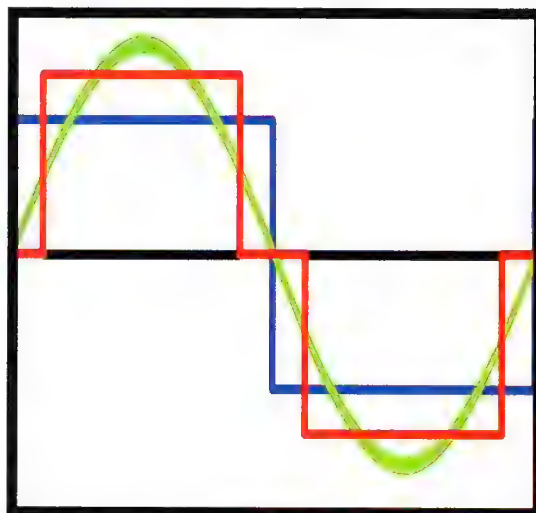
This is pretty expensive when you consider that PCs don't need them. They'll work fine on modified square wave power – that's the red waveform in the picture. Inverters that output this waveform are cheaper than sine wave units.

Most AC motors – power tools, for example – will run OK from modified square wave power as well, but they're likely to draw about 20% more power than you'd expect, and may buzz annoyingly. Things with circuitry that relies on clean sine wave power – electric clocks, bread makers, some battery chargers, the 'shaded pole' motors used by ceiling fans – are likely to misbehave.

The blue waveform in the picture, by the way, is a plain square wave. It's pretty hard to find plain square wave inverters any more.



① 'But I was going to the Toshi Station to pick up some power inverters!' 'You can waste time with your friends when your chores are done.'



① The green wave is a sinusoidal, the red is a modified square wave, while the blue is a plain square wave. Enthralling stuff.

The power supply

A UPS needs something to charge its battery, and run the inverter when the mains hasn't failed. Charging lead acid batteries with the 'constant voltage' method is easy. Charging them well is a somewhat less easy task.

If you connect a lead acid battery to a power supply that's set to deliver the same voltage as the battery can hold when it's fully charged, you'll charge the battery, and you won't overcharge it. This is called a 'float' charge; it's not the fastest way to get amp hours into the battery, but you can leave the charger connected forever without the risk of toasting the battery.

Unfortunately, a float charge will never quite top off a battery. And if you leave a lead acid battery on float forever, it'll slowly sulfate, just as if it were left flat briefly. A 'topping charge' of about 2.4 volts per cell (14.4 volts for a 12 volt battery) is needed about every six months for maximum battery life.

The charge circuitry in really classy commercial UPSes may do these periodic topping charges, but don't expect them from a cheap unit.

For the Lifeline battery I used, the float voltage is 13.2 to 13.4 volts, depending on temperature – higher temperature, lower voltage. I provided that by using my 25 amp variable-voltage bench supply, set to that voltage.

There's no way to do automatic topping charges with this thing, but there's nothing stopping you from twisting the knob up to 14.4 volts for a few hours every six months or so. And this power supply's 25 amp continuous rating means it can deliver 300W at 12 volts. Given the 85 to 95% efficiency of current-model inverters, you can run at least a 255W resistive load (about which I go into more detail in a moment) from it.

A supply like this isn't cheap, though. This one's a Jaycar Electronics (www.jaycar.com.au) MP-3088, which lists for \$359. Ordinary car battery chargers are a lot cheaper than that.

If you want 25 amps worth of charge, though, you won't get it from just one cheapo charger. Instead, you'll have to take multiple, identical chargers and hook them up to your battery in parallel.

This is about as elegant as making a 24-outlet powerboard out of double adaptors, but it'll work, provided your chargers don't try to do anything clever (which cheap ones won't; some of them don't even have a fuse), and provided they're all identical.

The ratings on cheap chargers are generally pretty optimistic, but three '10 amp' chargers ought to be able to manage 25 amps continuously.

If you can afford it, four will certainly manage 25 amps continuously without even building up a sweat and with plenty of headroom.

If the battery voltage at full charge doesn't significantly exceed the float voltage, then you can leave your cheap chargers connected forever. If it's higher, then you'll slowly cook the battery; if it's lower, then you're going to have early sulfation problems. But those chargers sure are cheap.



ⓘ 'Tomorrow I want you to take that R2 unit into Anchorhead and have its memory erased. That'll be the end of it. It belongs to us now.' 'That's a great looking PSU.'

Why do it yourself?

What's a separate-boxes DIY UPS rig good for, besides making you look all technical and competent?

Well, it lets you have monstrous battery capacity, if you like.

You can't just swap higher capacity batteries into an off-the-shelf UPS, and that's not just because they won't fit in the box. The standard charger circuitry is unlikely to deal well with a bigger battery. If a charge takes longer than it should, or the charge current goes too high, the UPS will just assume there's something wrong with the battery.

A dumb charger, like my DC power supply, doesn't have that limitation. That means you have to keep an eye on your battery, and set your voltage carefully. But it also means you can use a bank of truck batteries to power your PC for a week without mains, if you like.

A separate-boxes UPS is also useful for more things than a one-box unit. The little sealed battery in this setup has more than enough poke to start my car, for example, which is more than a 7Ah SLA brick can manage. And the power supply's something that I use all the time when I'm building and testing things, or just feel like setting fire to a pencil. And the inverter can be hooked up to a car battery anywhere to power various gadgets.

Note: driving around the city with a passenger who's pointing a 240 volt disco strobe at unsuspecting pedestrians is neither condoned nor encouraged by Atomic.

And even though it makes rain look really cool, please do not stand in the rain holding the strobe.

If none of these advantages appeal to you, of course, then there's no reason for you to buy these separate components. They won't give you a top-class charging system (unless you shell out for a top-class battery charger), they don't interface with a computer in any way, and they're hardly a neat and tidy solution.

But if you're looking for an industrial-capacity UPS solution, but you don't like the prices of the off-the-peg options, it might be easier than you think to roll your own.

You have mail

This month's reader pages have been proven to contain even more reader wisdom per square inch of text than ever before. Winner of LOTM and POTM this month will both have a CPU several degrees cooler thanks to a sparkling new Bitspower NP80D HSF from our special friends at AusPC Market (www.auspcmarket.com.au).

Decisions, decisions

I have been waiting for the latest batch of motherboards and CPUs to settle in before I upgrade. I own a sloooooow Pentium III 800MHz and as I enjoy playing FPS games I was thinking of upgrading to the latest AMD Athlon XP 1600+ processor and a compatible motherboard. However, after visiting three local stores to hand over my hard earned dollars, I was informed that if I purchased an AMD it would be returned in the near future for repairs and would be the source of much grief. Can you tell me what is going on?

Are AMD products that unstable or are these stores just Pentium stooges? I have all of your mags and think they're great! You all say AMD is legendary, especially for gamers, so could you please put my mind at ease so I can make my purchases and get stuck into all the new games? Glenn R.

While it's true that AMD CPUs have a slightly higher return rate than Intel CPUs, it's not enough of a difference to concern yourself with. Factor in the increased performance and much lower cost of the Athlon XP when compared with the Pentium 4, and the AMD CPU is the most compelling purchase.

Killing the messenger

Great magazine Atomic, loved the CD, better than those useless CDs you get on APC and such. It actually had tools that the rest of us use! Anyway, I have a couple of tricks that would be very useful for those running XP.

In Issue eleven you had a guide for getting rid of Messenger from Windows XP. I have a better way. Find sysoc.inf, it should be in C:\WINDOWS\inf, and open it. Next, replace all instances of 'hide' with a blank, and save to disk. Next, go to Add/Remove programs in the control panel and select Add/Remove Windows components. You should see a whole heap of components you couldn't before. Now, unselect the checkboxes for Windows Messenger and the evil MSN Explorer. Click Next, and presto, you've now got rid of two of the most pretentious and

evil features in windows AND saved yourself 15MB of HDD space.

Second, to all those who make a habit of posting in forums, and writing letters to magazines about cheating, get a freaking life! The only thing worse than cheaters on servers is players who accuse others of cheating only because they are outclassed, or have Net code issues due to their bad connections. These people ruin more games than a cheat due to their incessant whining, foul language and childish intimidation. Baal, (Issue eleven) I suggest you grow up, and try to limit your sentence fragments to one per post like the rest of us. Cheats are easy to fix: take a screen shot, get stats, and most server admins will be happy to ban that player's World and IP. But you pathetic losers are impossible to remove from a server.

KORELL

Glad you like the CD, as did the majority of our readers. Judging by the number of emails we got regarding putting Messenger out of its misery under Windows XP, it's obvious that this app doesn't have many friends. Try again Microsoft.

The truth about 3dfx

Reading Atomic as I sit here waiting for another SBlive driver download to trickle through the two tin cans and a piece of string that I pretend to call an Internet connection. Yippee! At last a decent computer mag. A publication for all types of enthusiasts. Brimming with honesty, integrity, benchmarks and scores I could trust. UNTIL someone wrote: "... NVIDIA, after wiping out 3dfx almost completely on the strength of product superiority."! Pardon me, but didn't I read that 3dfx wiped itself out almost completely on the strength of its own managerial incompetence? I wonder where I read that? I appreciate that NVIDIA probably pays a lot of bills at Atomic, but if you insist on rewriting history, then I won't read you anymore.

Paul Arumets

We tend to agree that the incompetence of 3dfx when it came to running a business is probably the leading cause of its free fall into nothingness. But there are those who believe that it wouldn't have mattered how badly 3dfx ran its company; NVIDIA brought superior products to the market, leaving 3dfx sales floundering in the wake of monumental feature creep and other perennial issues.

POTM: Not so long ago...

We had no choice but to award this month's POTM to Atomic stalwart, PhR33X. His rant about the decline in quality of Internet content and the lack of trust now involved in going online certainly opened some eyes in the Atomic forums. To read his words of wisdom head on over to www.atomiempc.com.au/forum.asp?cat=ge&top=22830.

"Not so long ago, you could find what you needed on the Net without being swamped with banners to sites that just want to sell you something, pop-ups that trick you to click through to a Web site that just wants to sell you something, or search results that are simply links to sites with pop-ups that just want to sell you something..."

PhR33X

'Such thermal egalitarianism results in loss of entropy that, if unchecked, will cause the premature death of the universe!'

Token conspiracy letter

I really like your mag. I buy it occasionally. I have just read Issue ten and have the following comments.

1. Rather than just put the issue number on the cover could you put the month? I bought an issue last week but did not realise it was an old issue, and was disappointed I could not enter your competition.
2. The article on tools was very interesting. One simple but useful tool that was not mentioned consists of a very thin tube with a spring-loaded button at the top.

When you press the button down, several wire 'claws' open out from the other end and close again when you release the button. I don't know what it is called but it is invaluable for picking up screws from inaccessible places. I think that this tool is more effective and certainly a much cheaper alternative than alligator forceps.

3. Soldering is not as easy as it is made out in the same article. One tip is to always apply the heat to the thing to be soldered not to the solder itself. Also, a cheap \$20 soldering iron is not recommended for electronics (unless they have improved in the last 20 years) since it would not be earthed and could damage components.

Also, a cheap iron may not generate enough heat, which means you have to hold it on the parts for a lot longer and (ironically) risk damaging them with too much heat.

4. What is the obsession with heat removal? All the issues I have bought have had major articles on fans, water-cooling, refrigerating and so on of different computer parts. I have had noisy fans (one on a 486DX2-66 and one on a TNT2 card) that I just removed with no ill effects.

I do not believe in the 'redistribution of heat'. Such thermal egalitarianism results in loss of entropy that, if unchecked, will cause the premature death of the universe!

Andrew Phillips

We've had a few requests to put the month on the cover of each issue, but when you factor in the lead time involved in creating each issue we believe it becomes even more confusing for the readers, which is not a good thing.

Thanks for your tool and soldering tips. Hopefully, you've helped to save a few dollars with that piece of advice. As for your concerns with our obsession with system cooling, you're the first person it seems to uncover our conspiracy to plunge the universe into the depths of darkness.

LOTM: Sircam be dammed

This month's LOTM goes to Andrew Akers, who had a novel approach to sorting out companies who let their Sircam problem get out of hand. If only everybody tried this approach, maybe there wouldn't be so many clueless network admins with jobs.

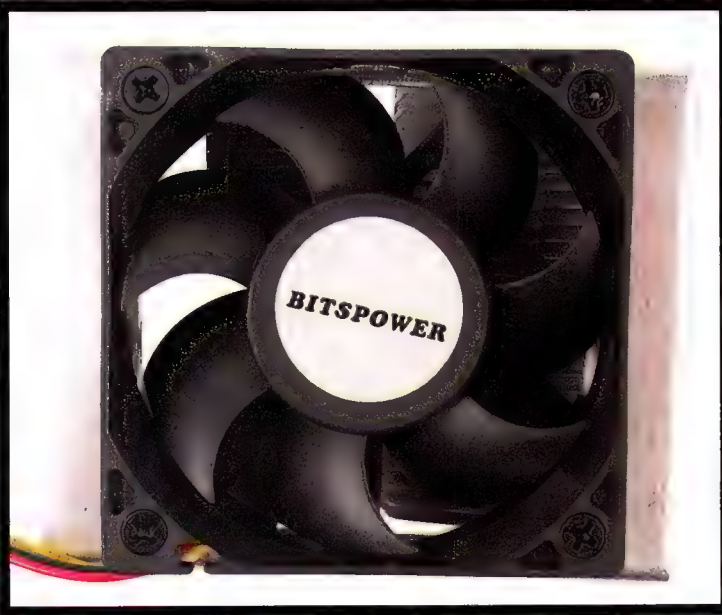
Dear Atomic,

A couple of issues ago in Atomic, Dan Rutter made mention of the Sircam virus – and a technique of snipping off the first 137216 bytes to get the original file cleaned. Is there somewhere that explains how to do this in language that non-geeks can comprehend? It's not that I want to discover top secret information – but I have some idiot company that has sent me hundreds of unsolicited emails with virus attachments. This is taking up valuable MBs allocated to me each month by my service provider. My ISP is for some reason unable to block these emails from reaching me (presumably quite happy to charge me for the traffic though!). I have attempted to contact the company at its return address to no avail, apart from an apparent increase in the number of unsolicited emails. My plan now is to open the attached files (without infecting my hard drive), discover the company's name and contact details (hopefully via letterhead or similar) and contact them directly. Failing that I hope to discover top secret information that will make me incredibly rich, in which case I will hire an assassin to track down the idiot who set up this virus in the first place – or at least information that will put the moronic company with the virus ridden computers out of business! Any information will be gratefully received.

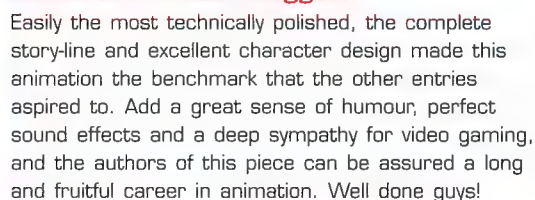
Andrew Akers

Sircam, huh. One particular Atomic staffer experienced hours of fun opening Sircam infected attachments he'd been sent. Because he thought he was doing very well when he finished reading his 12th Sircam file, a balance sheet from a certain London restaurant, he was overconfident when he received his 13th attachment and accidentally selected the 'open' command instead of the requisite 'open with' command. Needless to say, he hasn't tried it since. You can view Sircam files safely using a Hex editor such as Hex Workshop, but renaming the file to blah.txt and opening with humble Notepad will work just as well. You can find a simple introduction to how to use Hex Workshop at <http://cte.weylund-yutani.net/thevale/basicex/basicex-2.html>.

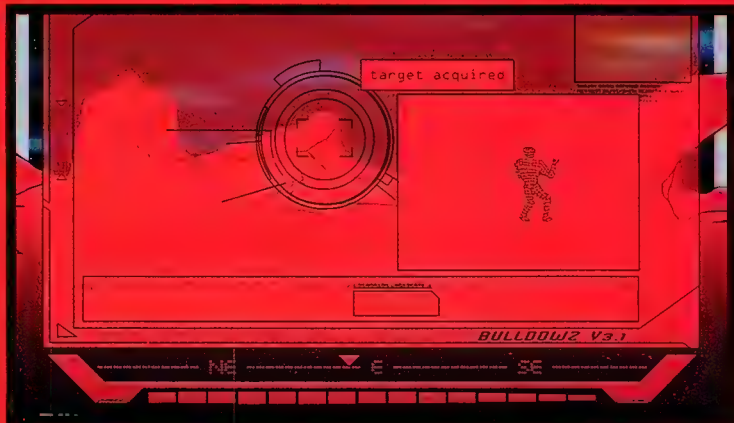
However, a word of warning: Playing with viruses can be dangerous to your computer's health, and Atomic cannot take responsibility if you manage to infect your box in the process.



The best darn tootin' Shockwave animation ever, that's what.

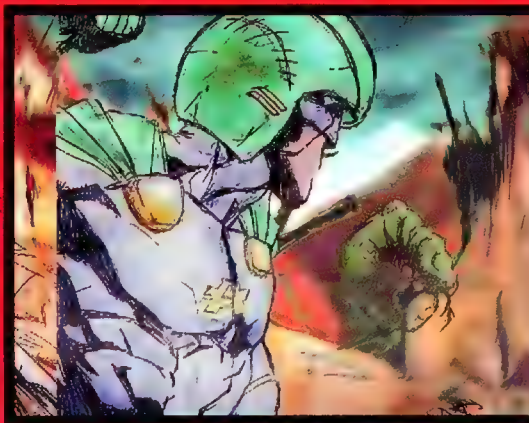


seemed to capture the feel of a Batman comic with lots of Kapow! and Blam! effects. We have to admit the bad guys totally outclassed Captain Atomic here.



ABOVE: Second place: Phuong Duong

This piece simply oozed style, with an amazing set and background design. Great character design and a brilliant DVD style interface made it hard to decide between this and the eventual winner. Unfortunately, the slow pace and non-compelling story-line held it back from 1st place.



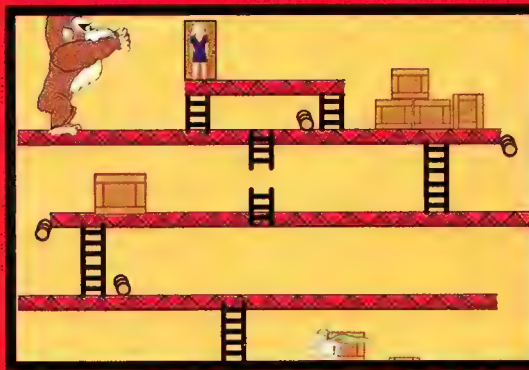
ABOVE: Third place: Michael Lombardi

Michael's piece displayed great artwork, an original design and animation, and hilarious voice acting. Especially noteworthy was the moody feel, which helped it to stand out from the rest of the pack.



ABOVE: Special mention

We have to mention Zoey Waycott's Captain Atomic meets Pac-Man animation for its off-beat sense of humour.



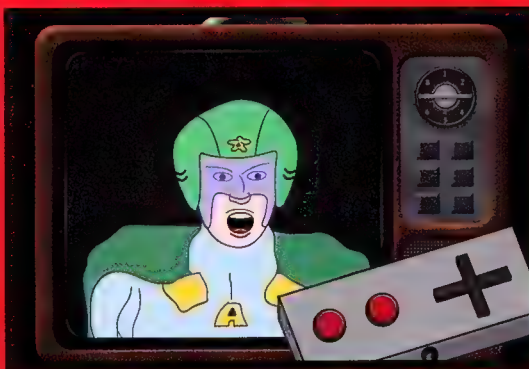
ABOVE: John Taylor and Jason Voss

threw our friend Captain Atomic headfirst into Donkey Kong land.



ABOVE: Michael Stockbridge

tried to tempt the judges with James Bondesque naked chick silhouettes and Goldeneye style content. Nice.



ABOVE: Friady Halim

was one of the many who paid tribute to Nintendo with this interactive button pusher.

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Soundblaster Audigy Platinum Ex	\$485
Hercules MUSE XL	\$60
Hercules GameTheatre XP 6.1	\$293
Hercules GameSurround Fortissimo	\$115

CDROOM/DVD

LG 16X DVD-ROM	\$125
LG 52X CDROM	\$70
Pioneer 16X DVD (Slot)	\$160
Pioneer 16X DVD (Tray)	\$148
Sony 16X DVD-ROM	\$130

CD-Writers

Sony 32X/16R/10RW CDRW	\$218
Sony 40X/24R/10RW CDRW	\$230
Imomega 40X/24R/10RW CDRW	\$231
Ricoh 40X/20R/10RW CDRW	\$275
Ricoh MP5120A DVD-CDRW	\$1075
Plextor 40X/24R/10RW CDRW	\$580

Memory

256MB PC133 SDRAM	\$86
512MB PC133 SDRAM	\$179
256MB PC2100 DDR SDRAM CL2.5	\$125
256MB PC2700 DDR SDRAM CL2.5	\$184
512MB PC2100 DDR SDRAM CL2	\$280
256MB PC2100 ECC DDR SDRAM Registered	\$210
512MB PC2100 ECC DDR SDRAM Registered	\$399
128MB PC800 RDRAM	\$138
256MB PC800 RDRAM	\$235

Monitors

Hitachi CM615 17" Monitor	\$389
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Hitachi CML152XW 15" TFT	\$940
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Sony CPD-E220 17" Monitor (Flat)	\$599
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Sony CPD-G520 21" Monitor (Flat)	\$2099

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Inwin 506 Midi-tower (250W PSU)	\$100
Inwin 508 P4 Midi-tower (300W PSU)	\$156
Lian Li PC-60 USB Midi-tower (350W PSU)	\$470
Lian Li PC-70 Full-tower (350W PSU)	\$595

Speakers

Altec Lansing APT3 2.1 Speakers	\$186
Altec Lansing APT5 4.1 Speakers	\$255
Altec Lansing ADA890 THX Speakers	\$604
Boston Acoustics BA4800 4.1 Speakers	\$425
Boston Acoustics BA7500 Dolby Digital	\$583
Creative PCWorks 2.1 Speakers	\$99
Creative FPS1600 4.1 Speakers	\$199
Klipsch Pro Media 2.1 Speakers	\$396
Klipsch Pro Media 4.1 Speakers	\$664
Klipsch Pro Media 5.1 Speakers	\$900

Zip Drives

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Imomega 250MB Zip (IDE Internal)	\$199
Imomega 250MB Zip (USB External)	\$399

Keyboards

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Microsoft Internet KB Pro	\$79
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Logitech Cordless Optical Desktop	\$219
Microsoft Wheelmouse Optical	\$39
Microsoft IntelliMouse Optical	\$65
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Canon BJC S450	\$289
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Epson C40UX	\$165
Epson C60UX	\$253
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HP 930C	\$261

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HP ScanJet 5400C USB	\$399
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Canon N640P	\$145
Canon N670U	\$172
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Netcomm 56K Fax/Data	\$45
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Kingmax 56K PCMCIA	\$103

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Intel Deluxe PC Camera.....\$125
Intel Pro Video PC Camera.....\$225
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Gigabyte Gf2 Pro 64mb TV Out \$285
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HD-100
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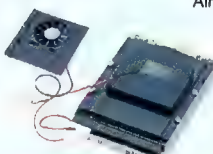
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HD-120
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Airflow:18CFM

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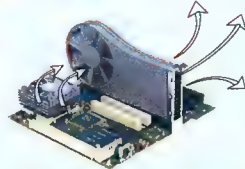
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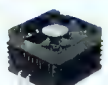


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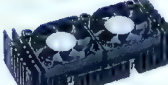


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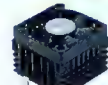
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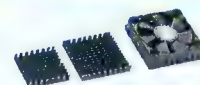
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P-500
For Socket 7, Socket 370 500 Mhz and up



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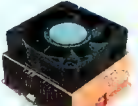
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(60x60x25mm)
SF-800/SF-800B
(Ball bearing)
(80x80x25mm)



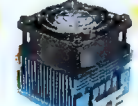
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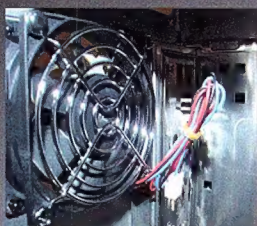
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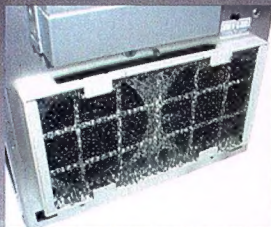
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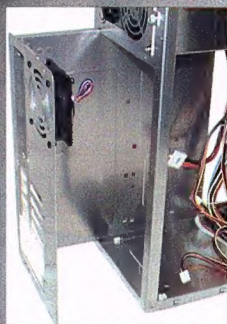
Twin front fans w/filter



Selectable fan speeds



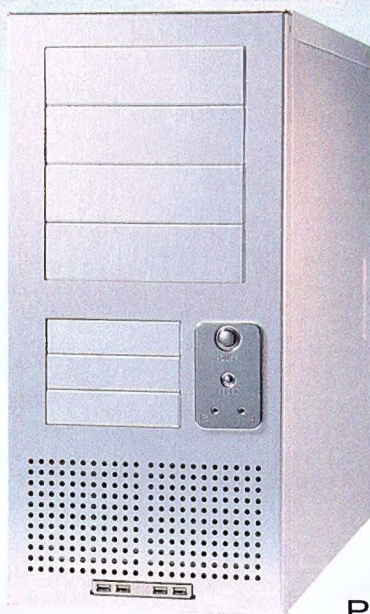
Twin fans cool your drives



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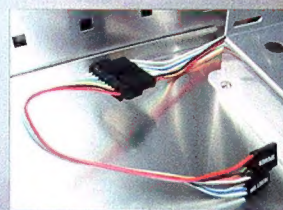
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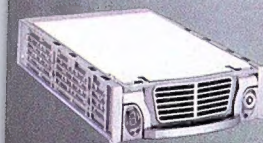


Thumb screws make easy work of assembly

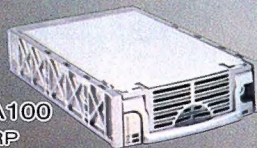


Detachable LED wiring

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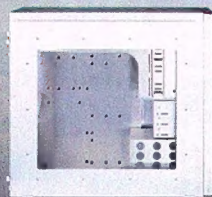


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Best Game Ever

The past few months have marked a renaissance in the games industry. The just-past batch of Christmas games have revived an industry that was getting a little bit boring. To keep these golden days of gaming rolling along, the Atomic crew has sat down and worked out, based upon these fantastic games, just what the perfect game would entail.

But first some groundwork. One of the most popular games of recent years has been Counter-Strike, so, like all good games, we should use this as a model of success. Therefore, the first prerequisite should be that the game is released as a mod for Half-Life, and should also include enough holes in the code for quick and easy development of cheats.

The game itself needs to make its own twist on the winning formula seen in the successful games of the past few months. In terms of overall plot and scale, the winner seems to be Civilization III, so our game will need to be on a turn based global scale spanning the length of human history, from the days of wooden clubs through to space colonisation.

However, for pure plot twist, the winner has been Aliens vs. Predator 2. Using three different character classes, with different play styles and controls, AVP2 makes for some interesting inter-special combat. Our game must therefore include a similar range of character types.

So, let's take some diverse character classes from other recent games. Everyone loves wrestlers, so the crew from WWF Smackdown are definite. Add to this those kooky zombies from Return to Castle Wolfenstein and round it out with the Russian Airforce from WWII, as seen in IL-2 Sturmovik.

Now that we have our protagonists and our overarching gameplay philosophy – a turn based historical epic – we need gameplay objectives. The most objective ridden game of late is

Grand Theft Auto III (yeah, we know, take our word for it). By far the most fun objective in this game is joyriding in stolen cars, so we will definitely rip that off.

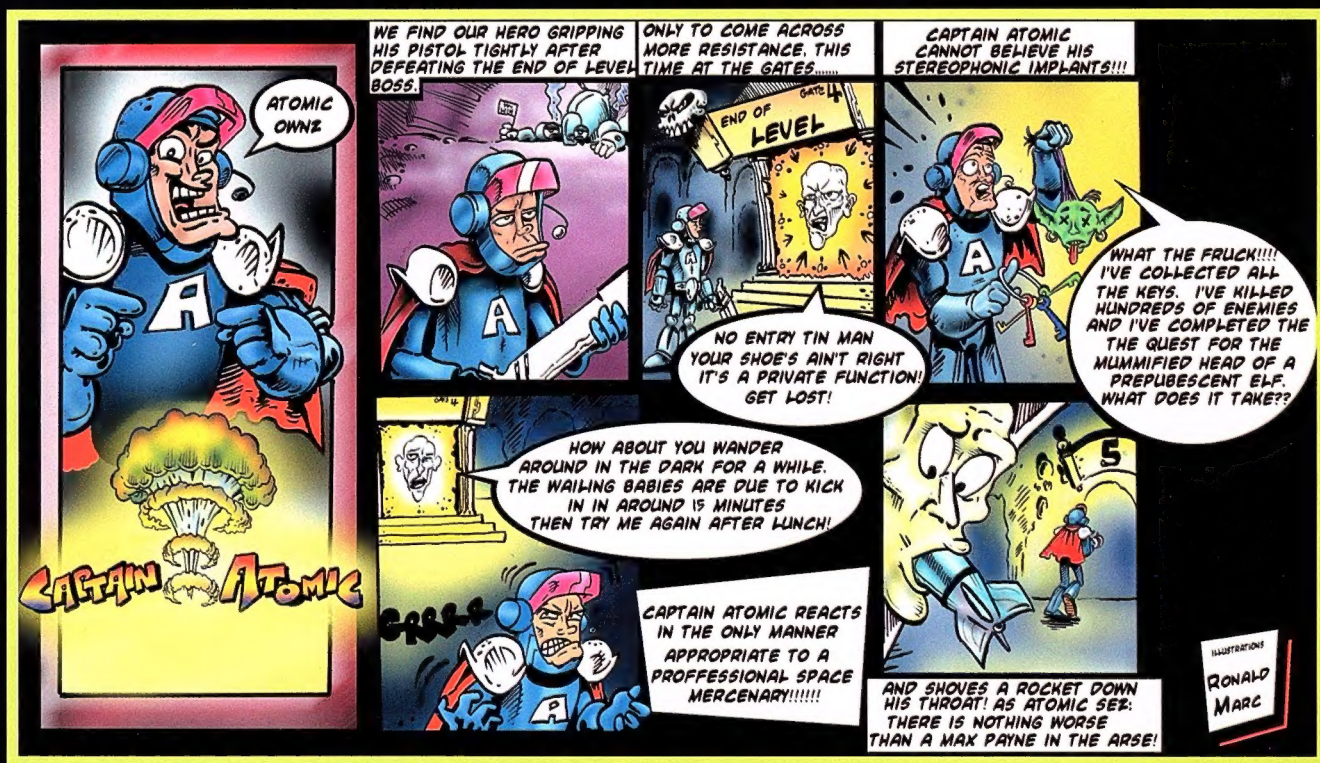
In the pursuit of variety we need more in the way of plot, so the second most likely culprit is Ghost Recon, with its focus on real-world Special Forces operations. These missions are of course important in terms of geopolitical significance, therefore, fit perfectly into the overarching plotline of the game.

Now that we have our gameplay and plotline sorted, we need a bleeding edge graphics engine to make it look downright sexy. Luckily, with Aquanox, we have one of the first fully DirectX 8 compliant games. Unfortunately, because the game is entirely set underwater, this will mean some tricky plot twists.

Thankfully, we can revert to the age-old tactic of setting the game far in the future, when Earth has undergone some sort of tragic post World War III nuclear winter that has resulted in the complete destruction of the world's landmasses, so plunging humanity into an existence below the ocean waves.

So to recap, the Best Game Ever should be a futuristic, post-apocalyptic turn based historical epic that tells the tale of three competing races – the wrestling stars of the WWF, Nazi-created zombies and the Russian Airforce from WWII – and their eternal battle below the waves for superiority. The player is plunged into an ongoing series of Special Forces battles and bouts of gritty urban car theft as they try to fight for eventual global domination. Plus you only need Half-Life to play it.

Interested? We certainly are.



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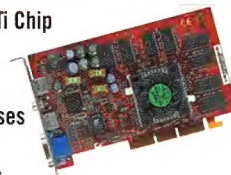
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- Full Version Game Software



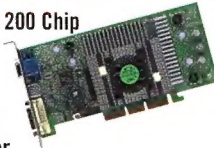
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- H/W Monitoring
- WinCoder Software
- WinProducer Software
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- Full Version Game Software



G3Ti200 Pro-TD

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- 64 MB DDR
- DVI output
- MSI Live VGA BIOS
- MSI Live VGA Driver
- MSI DVD, MSI 3D! Turbo Utility
- Full Version Game Software



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